TOSHIBA

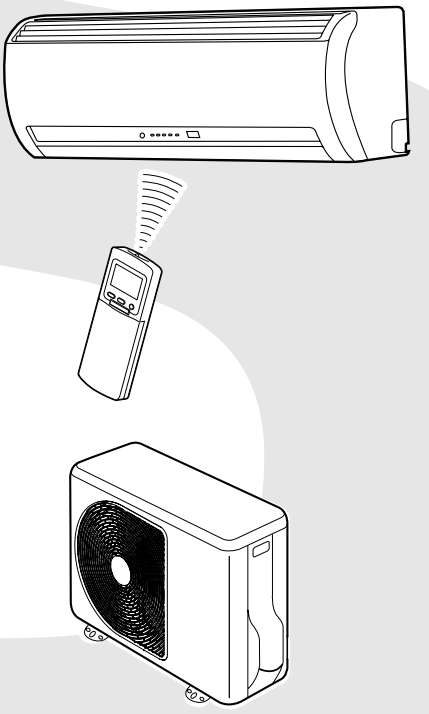
FILE NO. SVM-06027

SERVICE MANUAL

AIR CONDITIONER

SPLIT WALL TYPE

RAS-13GKHP-ES2 / RAS-13GAH-ES2
RAS-13GKP-ES2 / RAS-13GA-ES2
RAS-13NKHP-AS2 / RAS-13N2AH-AS2
RAS-13NKP-AS2 / RAS-13N2A-AS2



June 2006

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- **This air conditioner is charged with HFC (R410A) that doesn't deplete the Ozone layer.**
- **This air conditioner requires special installation for the refrigerant R410A.**

1. SPECIFICATIONS

ITEM \ MODEL			RAS-13GKHP-ES2 / RAS-13GAH-ES2 RAS-13NKHP-AS2 / RAS-13N2AH-AS2				RAS-13GKP-ES2 / RAS-13GA-ES2 RAS-13NKP-AS2 / RAS-13N2A-AS2	
			Cooling		Heating		Cooling	
Capacity			220V	240V	220V	240V	220V	240V
		kW	3.74	3.82	4.20	4.26	3.75	3.75
Power source		Phase	1∅					
		V	220 – 240					
		Hz	50					
Power consumption		kW	1.15	1.19	1.14	1.18	1.13	1.17
Power factor		%	98	96	96	95	98	97
Running current	Indoor	A	0.15					
	Outdoor	A	5.20	5.00	5.27	5.18	5.10	4.90
Starting current		A	30				26	
Moisture removal		lit/h	2.0					
Noise	Indoor (H/M/L)	dB	41/35/31					
	Outdoor (220-240V)	dB	50	51	50	51	50	51
Refrigerant	Name of refrigerant		R410A					
	Rated amount	kg	1.08				0.98	
Refrigerant control			Capillary tube					
Interconnection pipe	Gas side size	mm	∅ 12.7					
	Connection type		Flare connection					
	Liquid side size	mm	∅6.35					
	Connection type		Flare connection					
	Maximum length (One way)	m	15*1					
	Maximum height difference	m	6					
INDOOR UNIT			**RAS-13GKHP-ES2 RAS-13NKHP-AS2**				**RAS-13GKP-ES2 RAS-13NKP-AS2**	
Dimensions	Height	mm	275					
	Width	mm	790					
	Depth	mm	218					
Net weight		kg	10					
Evaporator type			Finned tube					
Indoor fan type			Cross flow fan					
Airflow volume	High fan	m^3/h	630		650		630	
	Medium fan	m^3/h	520		550		520	
	Low fan	m^3/h	430		490		430	
Fan motor output		W	20					
Air filter			Honeycomb woven filter with PP frame					
OUTDOOR UNIT			**RAS-13GAH-ES2,RAS-13N2AH-AS2**				**RAS-13GA-ES2,RAS-13N2A-AS2**	
Dimensions	Height	mm	550					
	Width	mm	780					
	Depth	mm	290					
Net weight		kg	39				38	
Condenser type			Finned tube					
Outdoor fan type			Propeller fan					
Airflow volume		m^3/h	2120	2200	2120	2200	2030	2150
Fan motor output		W	42				30	
Compressor	Model		PA150X2C-4FT					
	Output	W	1100					
Safety device			Fuse, Overload relay					
Louver type			Automatic louver					
Usable outdoor temperature range		°C	15 ~ 43		–10 ~ 24		15 ~ 43	

Note : 1

- Capacity is based on the following temperature conditions.

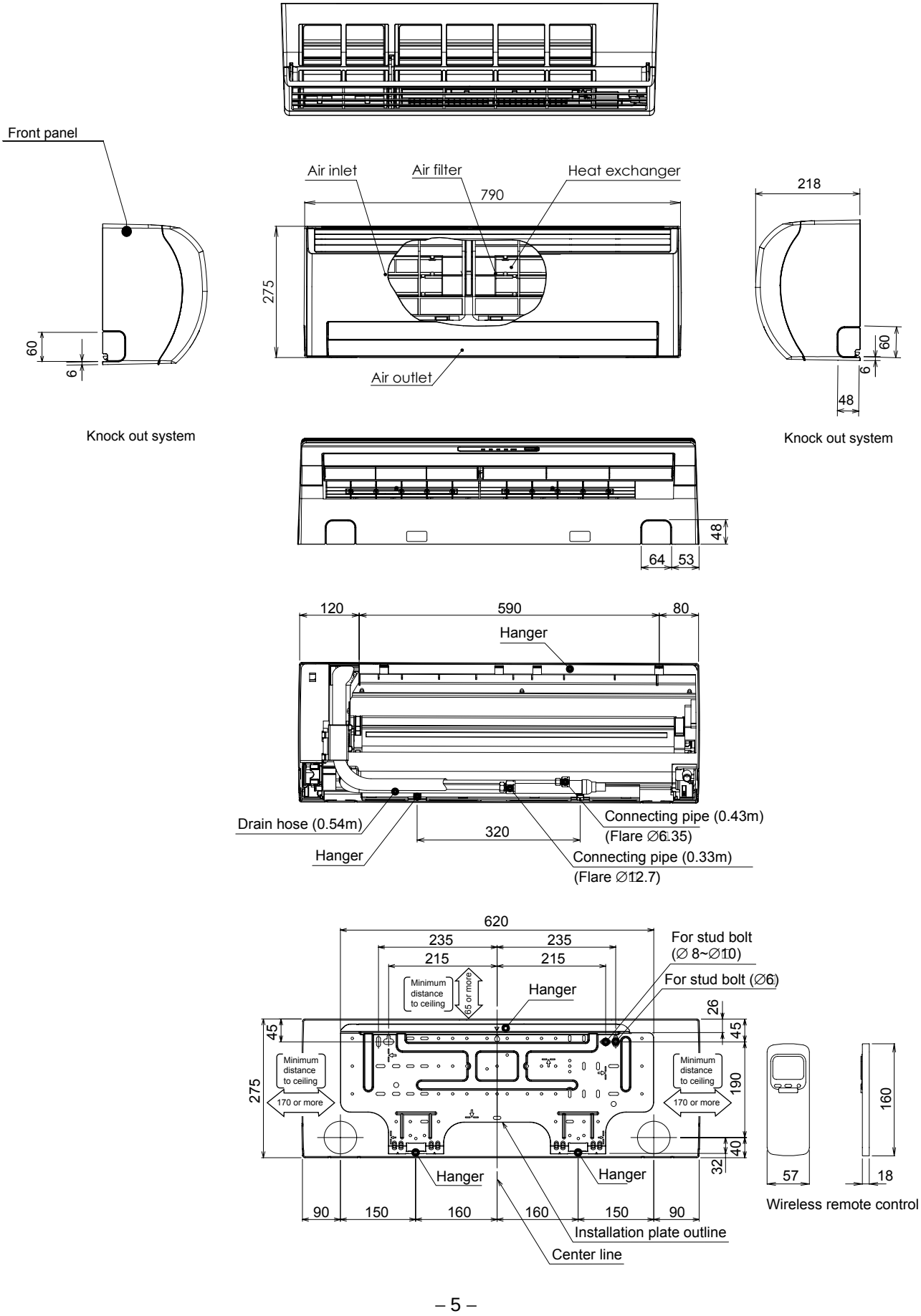
Temperature \ Condition		JIS B8615-1	
		Cooling	Heating
Indoor unit inlet air temperature	(DB)	27°C	20°C
	(WB)	19°C	15°C
Outdoor unit inlet air temperature	(DB)	35°C	7°C
	(WB)	24°C	6°C

Note : 2

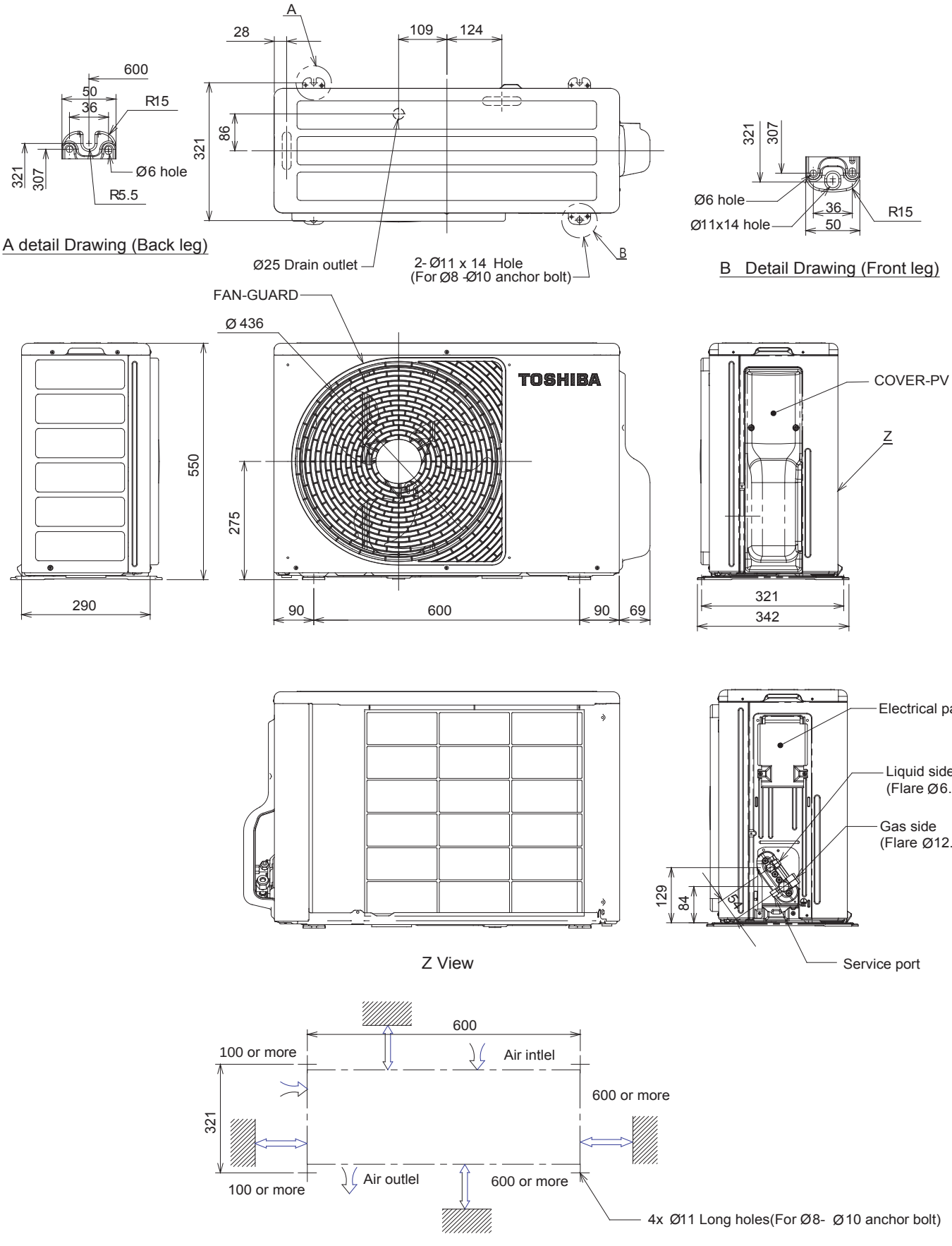
*1 No need to charge extra refrigerant.

2. CONSTRUCTION VIEWS

2-1. Indoor Unit

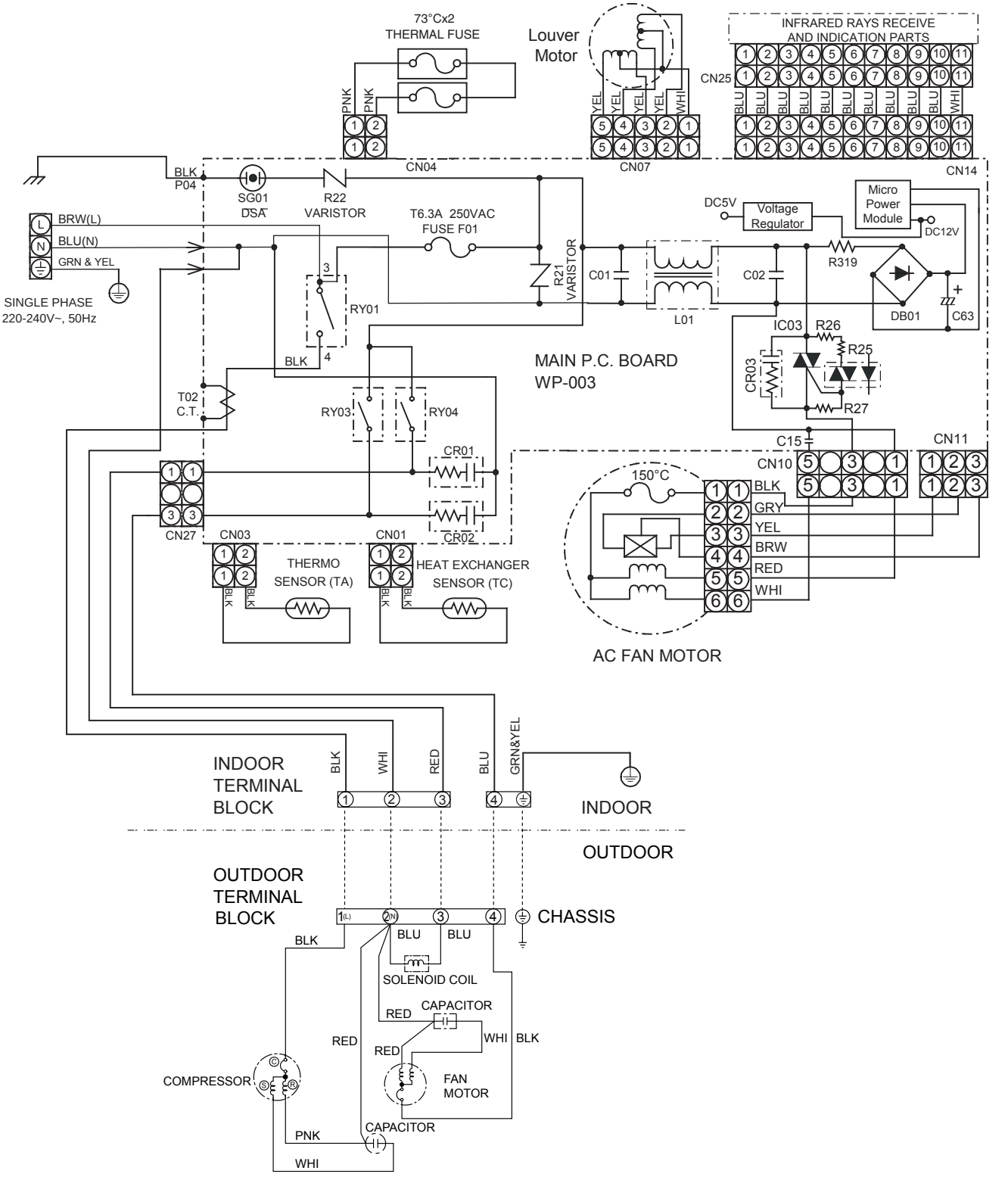


2.2. Outdoor Unit

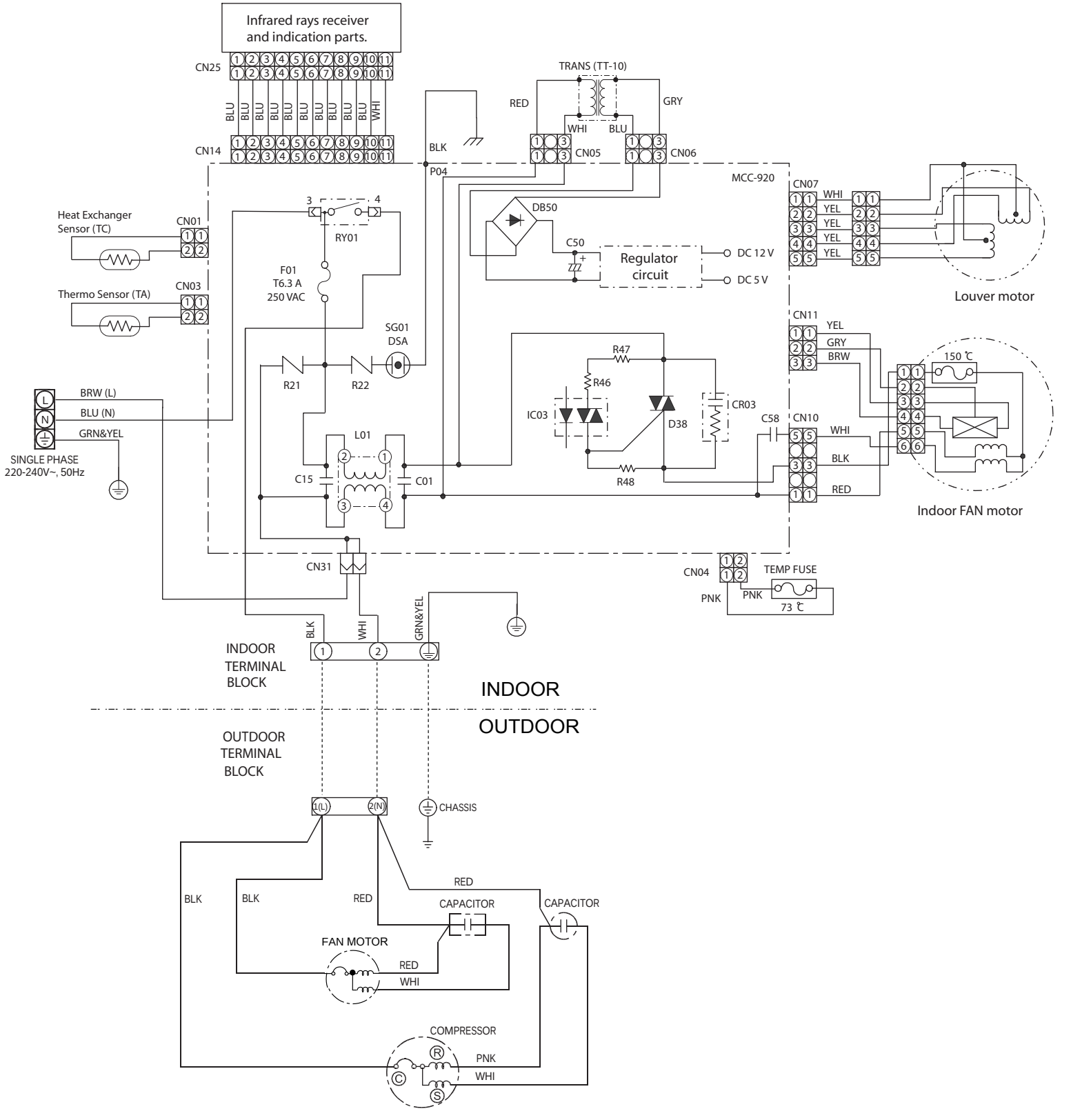


3. WIRING DIAGRAM

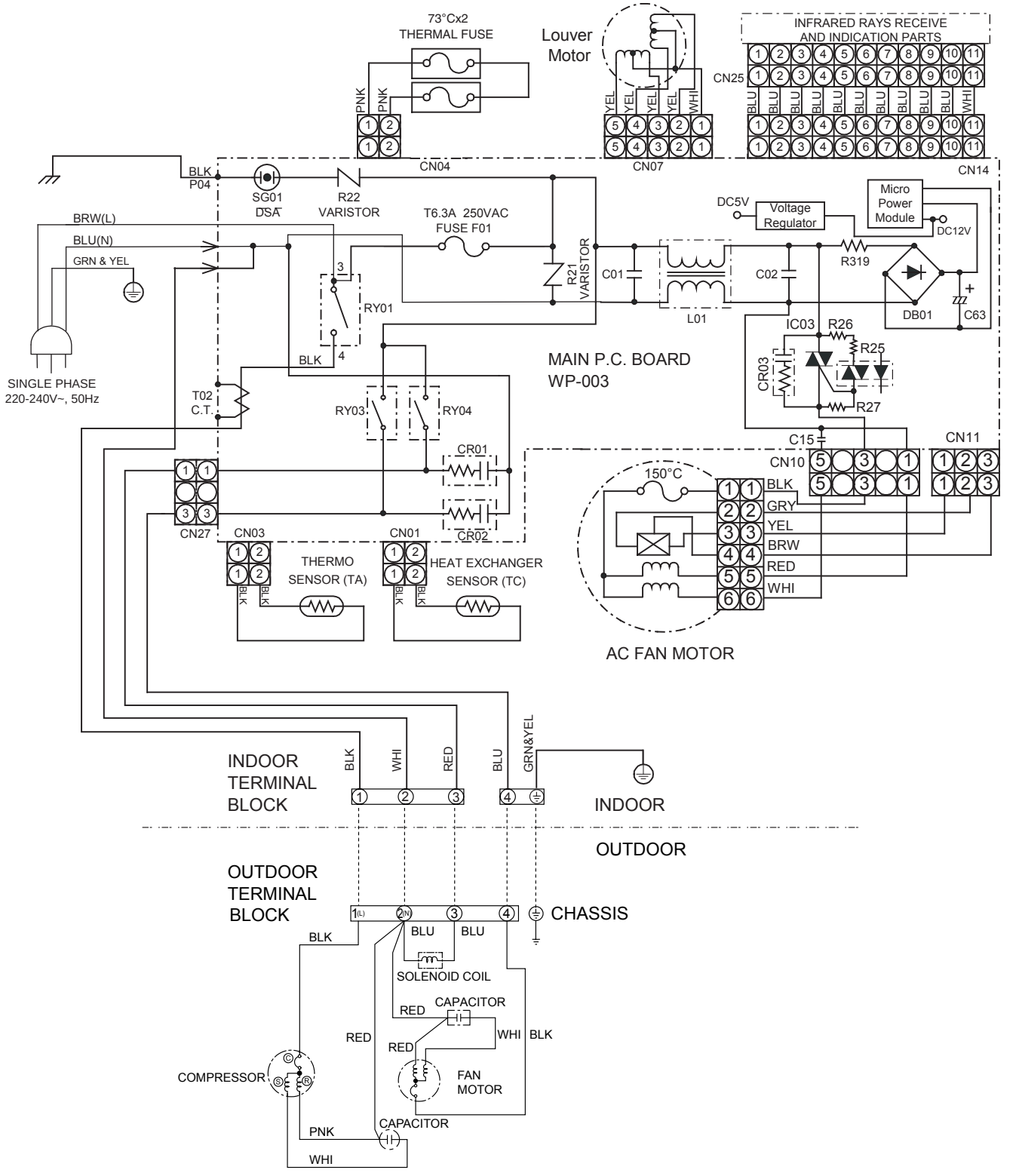
3-1. RAS-13GKHP-ES2 / RAS-13GAH-ES2



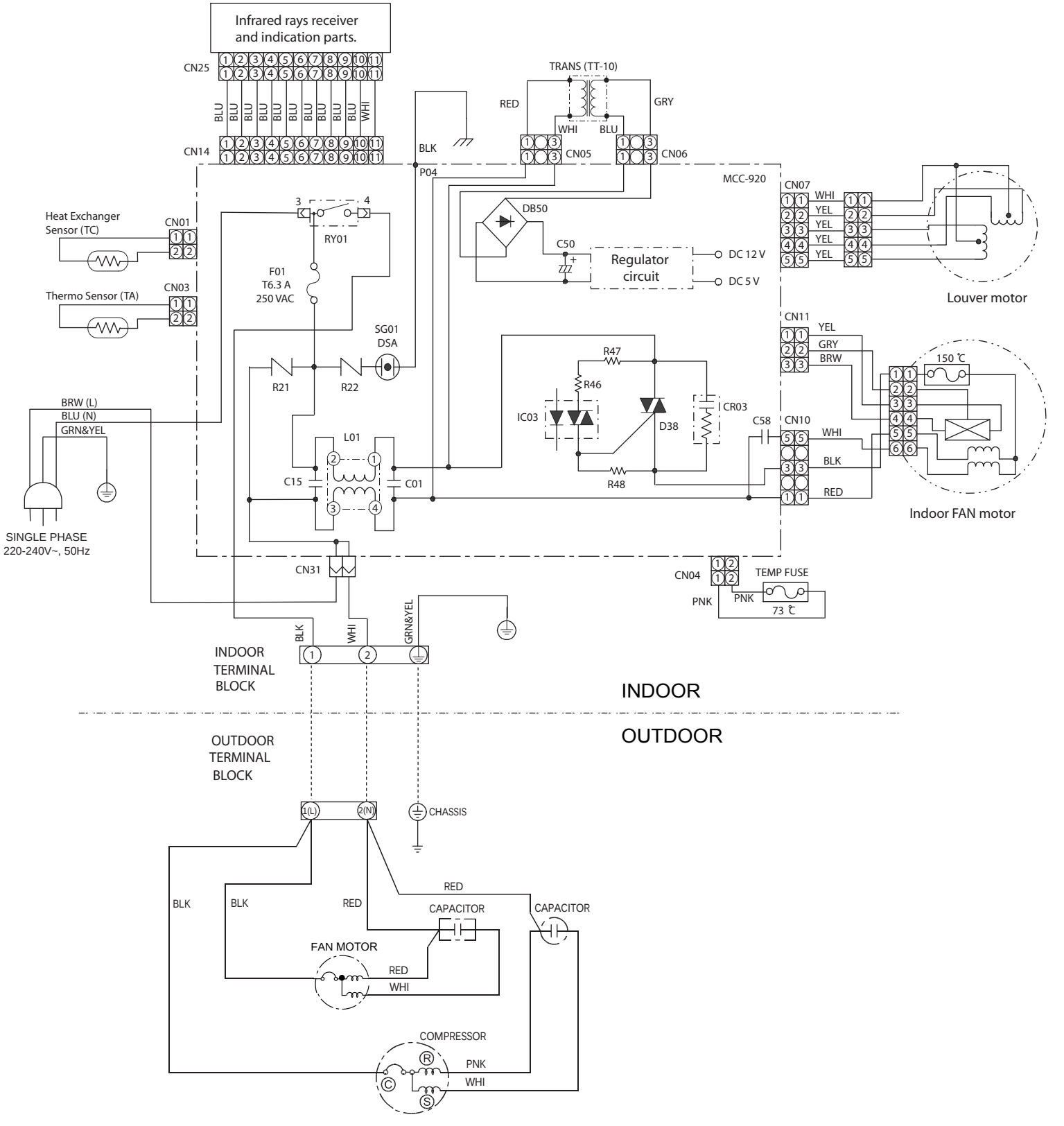
3-2. RAS-13GKP-ES2 / RAS-13GA-ES2



3-3. RAS-13NKHP-AS2 / RAS-13N2AH-AS2



3-4. RAS-13NKP-AS2 / RAS-13N2A-AS2



4. SPECIFICATION OF ELECTRICAL PARTS

4-1. Indoor Unit (RAS-13GKHP-ES2, RAS-13NKHP-AS2)

No.	Parts name	Type	Specifications
1	Fan motor (for indoor)	SKF-220-20-4A-1	AC Motor with 150 °C thermo fuse
2	Thermo sensor (TA-sensor)		10kΩ at 25°C
3	Micro Power Module (M01)	μRM1260V	DC 390V, Secondary DC 12V
4	Microcontroller unit (IC30)	TMP87CM40AN	
5	Heat exchanger sensor (TC-sensor)		10kΩ at 25°C
6	Line filter (L01)	LC*SS11V-06270	27mH, 600mA
7	Bridge rectifier (DB01)	D3SBA60	4A, 600 V
8	Capacitor (C63)	KMH400VSSN47M22S	47μF, 400 V
9	Fuse (F01)	BET 6.3A	T6.3A, 250VAC
10	Varistor (R21, R22)	TND15G561K	560 V
11	Resistor (R319)	RF-2TK5R6	5.6Ω, 2 W
12	Louver motor	MP24Z	12VDC
13	Relay (Comp., RY01)	DI1U	Rating 25A/AC250 V, 3-48VDC
14	Relay (Fan, RY03)	G5NB-1A	Rating 3A/AC250 V, 12VDC
15	Relay (Solenoide, RY04)	G5NB-1A	Rating 3A/AC250 V, 12VDC

4-2. Outdoor Unit (RAS-13GAH-ES2, RAS-13N2AH-AS2)

No.	Parts name	Type	Specifications		
1	Compressor	PA150X2C-4FT	Output (Rated) 1100W, 2poles, 1 phase, 220 – 240V, 50Hz		
			Winding resistance (Ω) (at 20°C)	C-R	C-S
				2.35	3.22
2	Fan motor (for outdoor)	HF-240-42A or WLF-240-42A	Output (Rated) 42W, 6poles, 1 phase, 220 – 240V, 50Hz		
			Winding resistance (Ω) (at 20°C)	Red-Black	White-Black
				176.2 or 188	290.5 or 289
3	Running capacitor (for fan motor)	DS451155NPQB	AC 450V, 1.5μF		
4	Running capacitor (for compressor)	RS44B306U0214S	AC 440V, 30μF		
5	Solenoid coil (for 4-way valve) (for Heat pump model)	STF-01AJ503H1	AC 220 – 240V, 50Hz		

4-3. Indoor Unit (RAS-13GKP-ES2, RAS-13NKP-AS2)

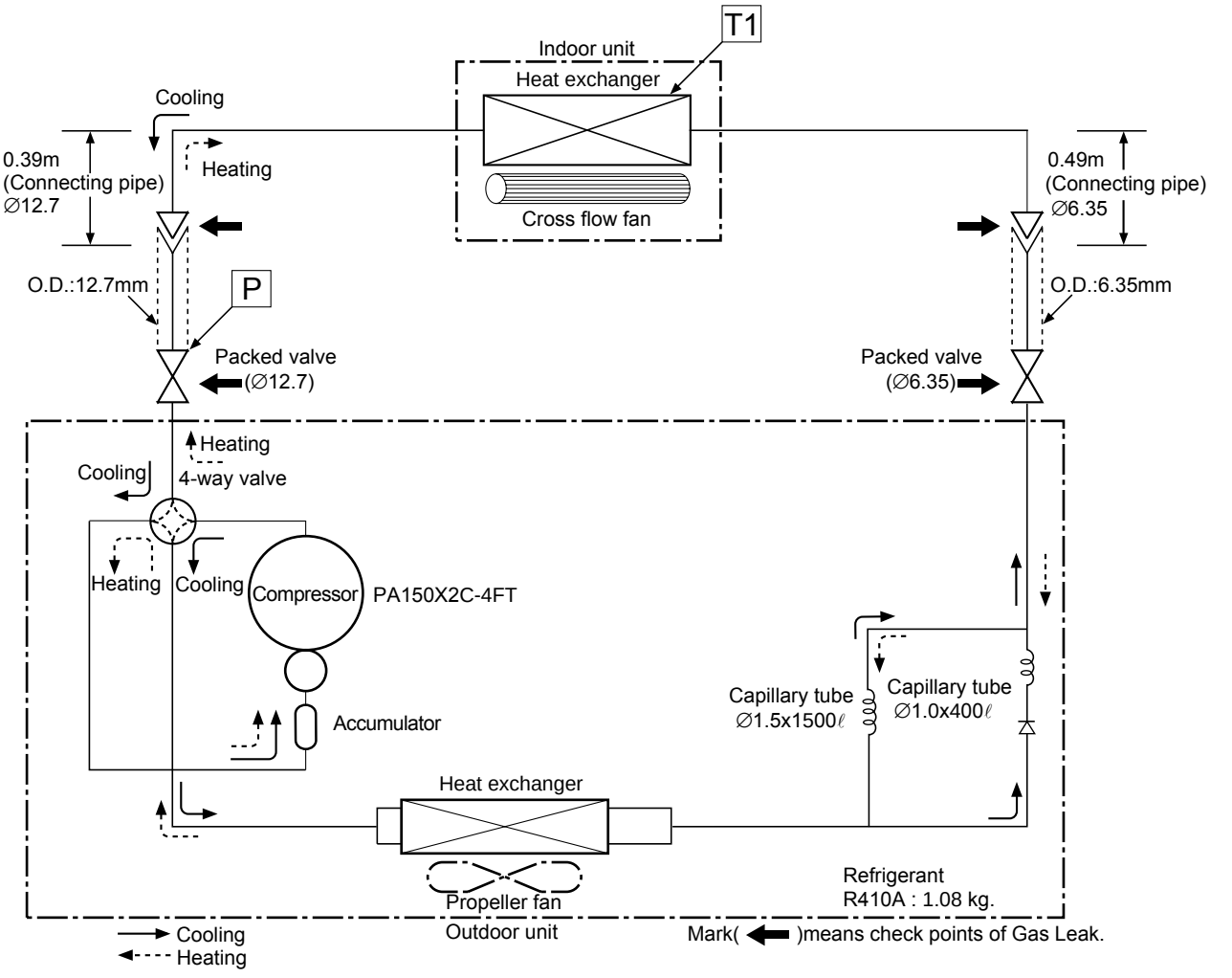
No.	Parts name	Type	Specifications
1	Fan motor (for indoor)	SKF- 220-20-4A-1	AC Motor with 150°C thermo fuse
2	Thermo sensor (TA-sensor)		10kΩ at 25°C
3	Transformer	TT-10	
4	Microcontroller unit (IC30)	TMP87CM40AN	
5	Heat exchanger sensor (TC-sensor)		10kΩ at 25°C
6	Line filter (L01)	*SS11V-06270	27mH, 600mA
7	Bridge rectifier (DB50)	KBP06M/51	1.5A, 600 V
8	Capacitor (C50)	PF1E222MNN1625	2200μF, 25 V
9	Fuse (F01)	BET6.3A	T6.3A, 250VAC
10	Varistor (R21, R22)	TND15G561K	560 V
11	Louver motor	MP24Z	12VDC
12	Relay (Comp., RY01)	DI1U	Rating 25A/AC250 V, 3~48VDC

4-4. Outdoor Unit (RAS-13GA-ES2, RAS-13N2A-AS2)

<table>
<tr><th>No.</th><th>Parts name</th><th>Type</th><th colspan="3">Specifications</th></tr>
<tr><td rowspan="3">1</td><td rowspan="3">Compressor</td><td rowspan="3">PA150X2C-4FT</td><td colspan="3">Output (Rated) 1100W, 2poles, 1 phase, 220 – 240V, 50Hz</td></tr>
<tr><td>Winding resistance (Ω)</td><td>C-R</td><td>C-S</td></tr>
<tr><td>(at 20°C)</td><td>2.35</td><td>3.22</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Fan motor (for outdoor)</td><td rowspan="3">WLF-240-30A</td><td colspan="3">Output (Rated) 30W, 6poles, 1 phase, 220 – 240V, 50Hz</td></tr>
<tr><td>Winding resistance (Ω)</td><td>Red-Black</td><td>White-Black</td></tr>
<tr><td>(at 20°C)</td><td>237</td><td>380</td></tr>
<tr><td>3</td><td>Running capacitor (for fan motor)</td><td>DS451155NPQB</td><td colspan="3">AC 450V, 1.5μF</td></tr>
<tr><td>4</td><td>Running capacitor (for compressor)</td><td>RS44B306U0214S</td><td colspan="3">AC 440V, 30μF</td></tr>
</table>

5. REFRIGERATION CYCLE DIAGRAM

5-1. RAS-13GKHP-ES2 / RAS-13GAH-ES2
RAS-13NKHP-AS2 / RAS-13N2AH-AS2



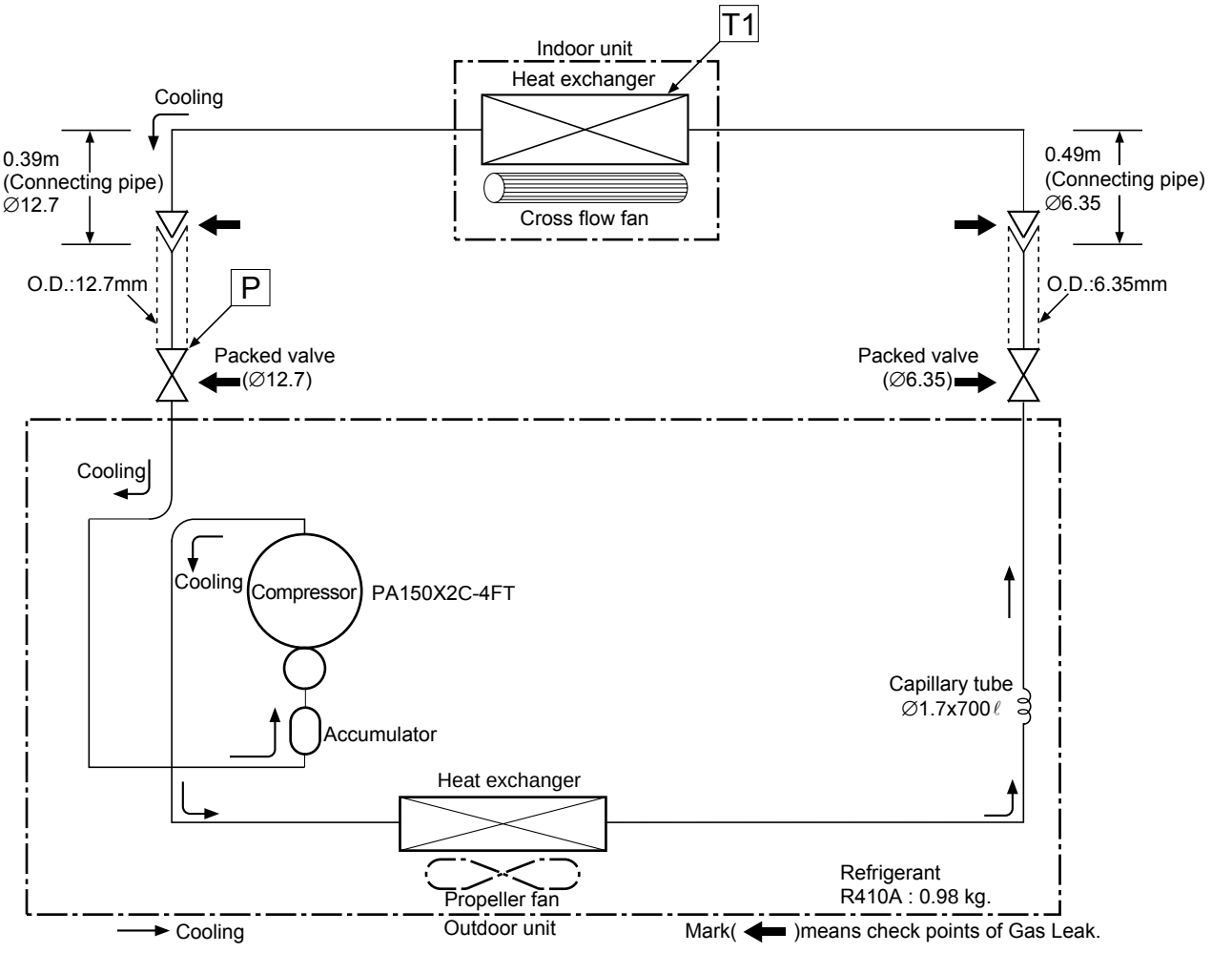
50Hz		Standar d pressure P (MPaG)	Surface temp. of heat exchang er inter changing pipe T1 (°C)	Fan speed (indoor)	Ambient temp. conditions DB/WB (°C)	
					Indoor	Outdoor
Heating	Standard	2.70	44.5	High	20/15	7/6
	Overload*1	3.12 ~ 3.77	52.0 ~ 56. 8	Low	27/–	24/18
	Low temperature	2.20	35.0	High	20/–	–10/–10
Cooling	Standard	0.90	10.0	High	27/19	35/24
	Overload	0.99	14.0	High	32/23	43/26
	Low temperature	0.65	2.0	Low	21/15	21/15

Note :

- □ Measure the heat exchanger temperature at the center of U-bend. (By means of TC sensor)

*1 • □ During heating overload operation, a value for the high temperature limit control operation is included.

5-2. RAS-13GKP-ES2 / RAS-13GA-ES2
RAS-13NKP-AS2 / RAS-13N2A-AS2



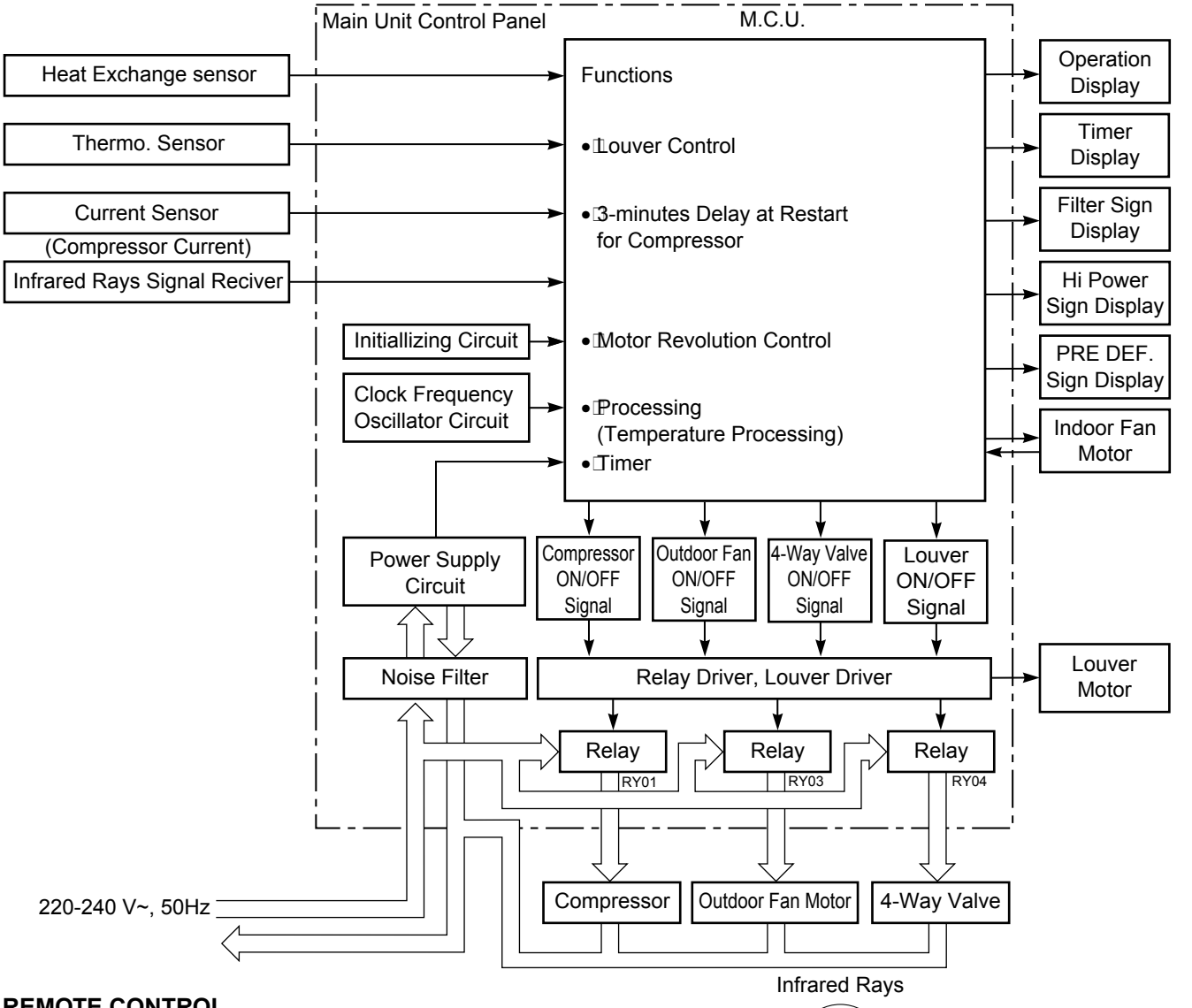
50Hz		Standard pressure P (MPaG)	Surface temp. of heat exchanger inter changing pipe T1 (°C)	Fan speed (indoor)	Ambient temp. conditions DB/WB (°C)	
					Indoor	Outdoor
Cooling	Standard	0.80	10.0	High	27/19	35/24
	Overload	1.04	15.0	High	32/23	43/26
	Low temperature	0.72	2.0	Low	21/15	21/15

Note :

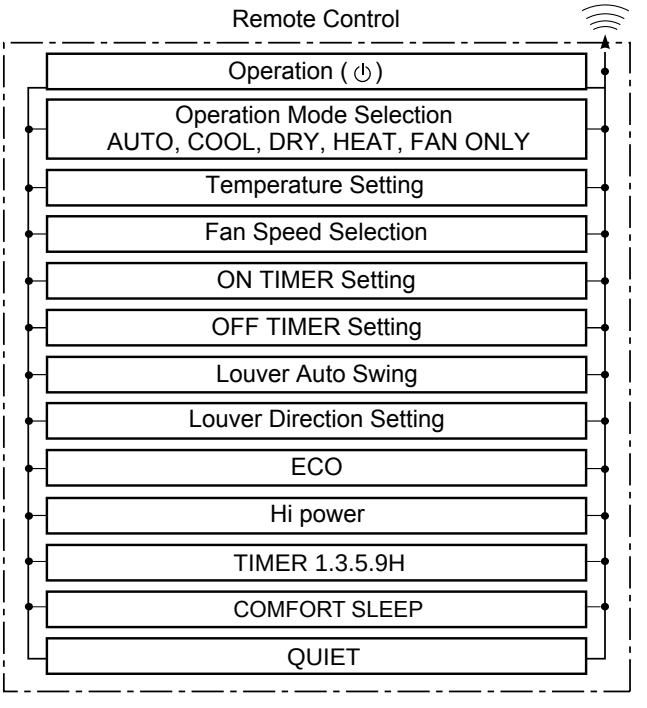
- Measure the heat exchanger temperature at the center of U-bend. (By means of TC sensor)

6. CONTROL BLOCK DIAGRAM

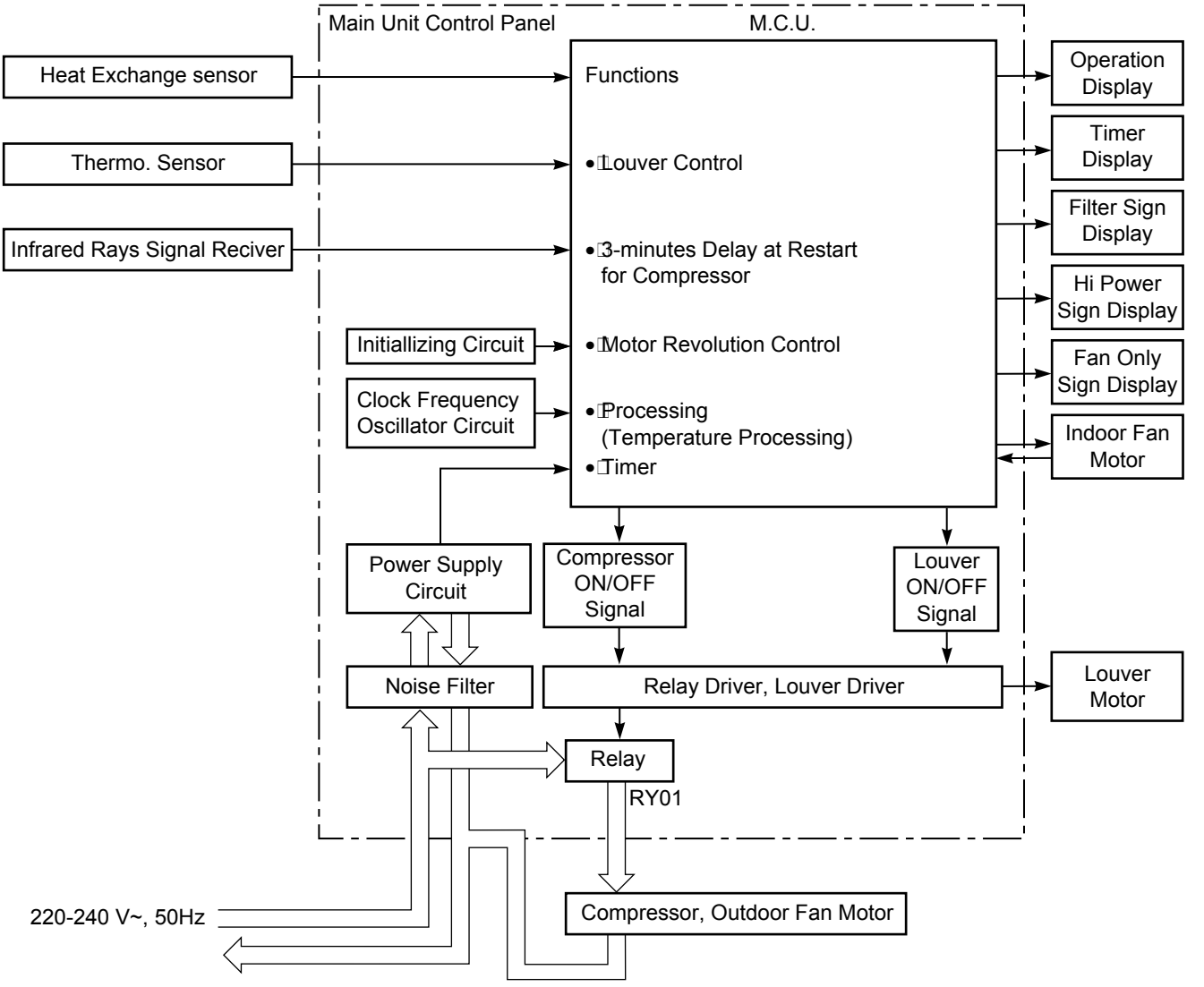
6-1. RAS-13GKHP-ES2 / RAS-13GAH-ES2, RAS-13NKHP-AS2 / RAS-13N2AH-AS2



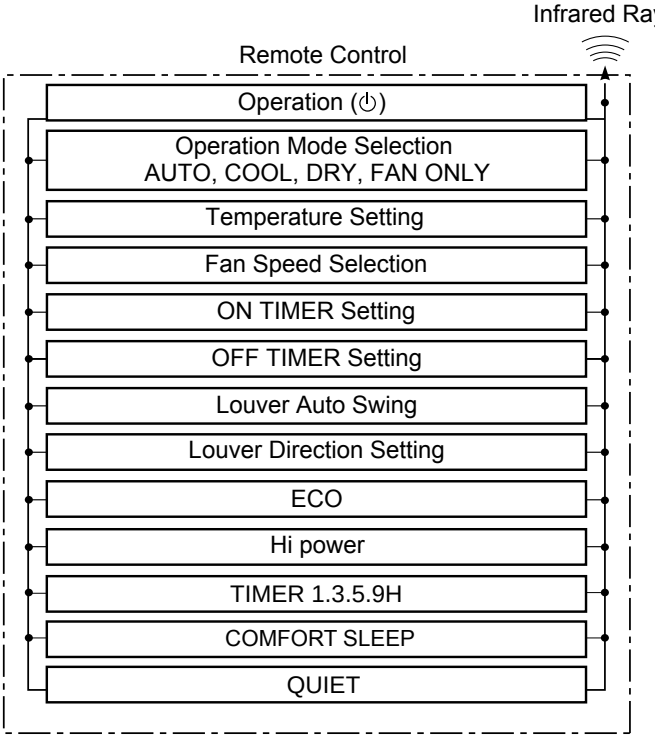
REMOTE CONTROL



6-2. RAS-13GKP-ES2 / RAS-13GA-ES2, RAS-13NKP-AS2 / RAS-13N2A-AS2



REMOTE CONTROL



7. OPERATION DESCRIPTION

7-1. Outline of Air Conditioner Control

This is a fixed capacity type air conditioner, which uses AC motor for an indoor fan. The AC motor drive circuit is mounted in the indoor unit. And electrical parts which driving the compressor and the outdoor fan motor, are mounted in the outdoor unit.
The air conditioner is controlled by the controller mounted in the indoor unit. The controller operates all components based on the commands transmitted from the remote control and the feedback data of the sensor is as follow:

- The temperature measurement at the air inlet of the indoor heat exchanger by the indoor temperature sensor
- The temperature measurement at the indoor heat exchanger by the indoor heat exchanger temperature sensor
- Indoor fan motor operation control
- Louver motor control
- LED display control
- Outdoor fan motor operation control
- 4-WAYS-VALVE operation control (Heat pump model only)
- Compressor operation control
- Receiving the information of the operation status and judging the information or the indication of errors

7-1-1. Louver control

(1) Vertical air flow louver
Position of veritcal air flow louver is automatically controlled according to the operation mode. Besides, position of vertical air flow louver can be arbitrarily set by pressing [FIX] button.
The louver position which is set by [FIX] button is stored in the microcontroller, and the louver is automatically set at the stored position for the next operation.

(2) Swing
If [SWING] button is pressed when the indoor unit is in operation, the vertical air flow louver starts swinging. When [SWING] button is pressed again, it stops swinging.

7-1-2. Indoor fan control (AC Fan motor)

(1) The indoor fan is operated by the stepless speed change AC motor.

(2) For air flow level, speed of the indoor fan motor is controlled in five steps (LOW, LOW$^+$, MED, MED$^+$ and HIGH). If AUTO mode is selected, the fan motor speed is automatically controlled by the difference between the preset temperature and the room temperature.

$$LOW^+ = \frac{LOW+MED}{2}$$

$$MED^+ = \frac{MED+HIGH}{2}$$

Table 7-1-1

			FAN TAP													
OPERATION MODE		Cooling			UH	H		M			L	L-	UL	SL		
		Fan only				H		M			L	L-				
		Dry						M			L	L-	UL		SL	
		Heat	UH	H			M		L	L-		UL				SL
Model	RAS-13GKP Series RAS-13NKP Series	rpm	1350			1300	1150	1100	1050	1000	950	900	850	800	750	700
		Air flow volume (m^3/h)	650			630	550	520	490	460	430	400	370	340	310	280
	RAS-13GKHP Series RAS-13NKHP Series	rpm	1350			1300	1150	1100	1050	1020	950	900	850	800	700	550
		Air flow volume (m^3/h)	650			630	550	520	490	470	430	400	370	340	280	190

7-2. Description of Operation Circuit

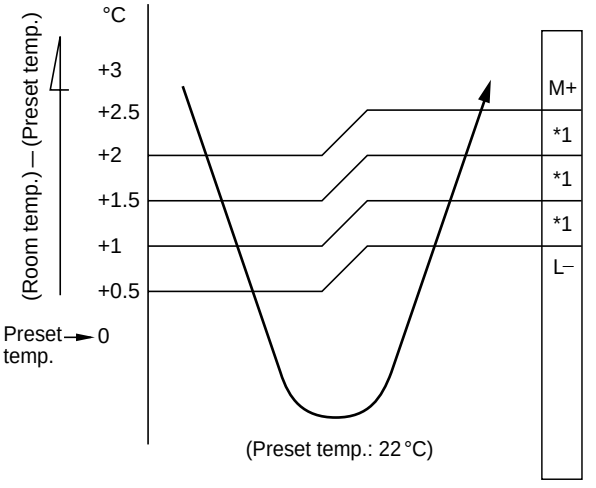
(1) When turning on the breaker, the operation lamp blinks. This means that the power supply is on.

(2) When pressing [⏻] button on the remote control, receiving beep sounds from the indoor unit, and the next operation is performed together with opening the vertical air flow louver.

(3) Once the operation mode is set, it is memorized in the microcontroller so that the previous operation can be effected thereafter simply by pressing [⏻] button.

7-2-1. Fan only operation ([MODE] button on the remote control is set to the fan only operation.)

(1) When [FAN] button is set to AUTO, the indoor fan motor operates as shown in Fig. 7-2-1. When [FAN] button is set to LOW, LOW⁺, MED, MED⁺ or HIGH, the motor operates with a constant air flow.



NOTE :

*1: The values marked with *1 are calculated and controlled by the difference in motor speed between M+ and L–.

(2) The Hi POWER, ECO and COMFORT SLEEP operation cannot be set.

Fig. 7-2-1 Setting of air flow [FAN:AUTO]

7-2-2. Cooling operation ([MODE] button on the remote control is set to the cooling operation.)

(1) The compressor, 4-way valve, outdoor fan and operation display on the remote control are controlled as shown in Fig. 7-2-2.

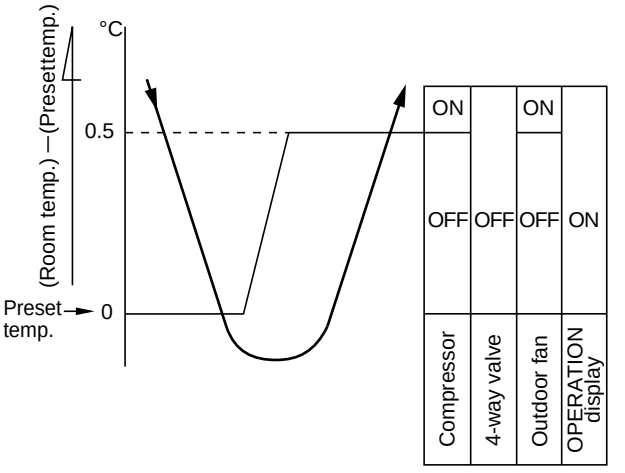
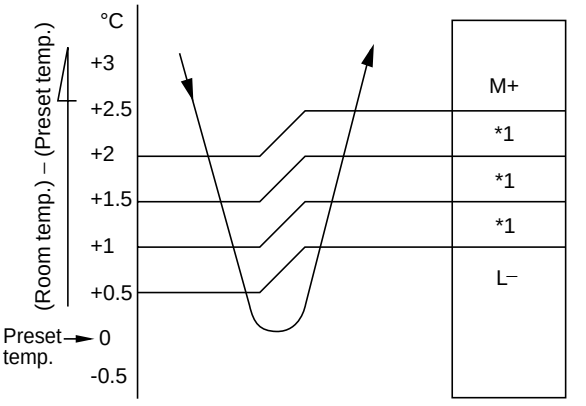


Fig. 7-2-2

(2) When [FAN] button is set to AUTO, the indoor fan motor operates as shown in Fig. 7-2-3. When [FAN] button is set to LOW, LOW⁺, MED, MED⁺ or HIGH, the motor operates with a constant air flow.



NOTE :

*1: The values marked with *1 are calculated and controlled by the difference in motor speed between M+ and L–.

Fig. 7-2-3 Setting of air flow [FAN:AUTO]

7-2-3. Dry operation ([MODE] button on the remote control is set to the dry operation.)

(1) The compressor, 4-way valve, outdoor fan and operation display on the remote control are controlled as shown in Fig. 7-2-4.

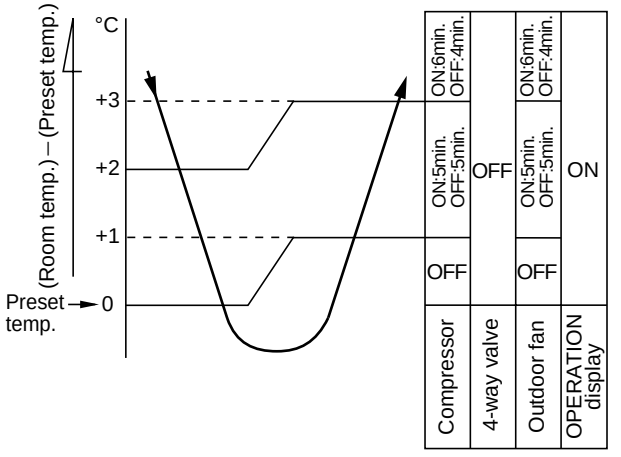


Fig. 7-2-4

(2) The microcontroller turns the compressor on and off at the regular intervals (4 to 6 minutes). While the compressor is turning off, the indoor fan motor operates in the SUPER LOW position.
The pattern of operation depending on the relation between room temperature and preset temperatures is shown in Fig. 7-2-5.

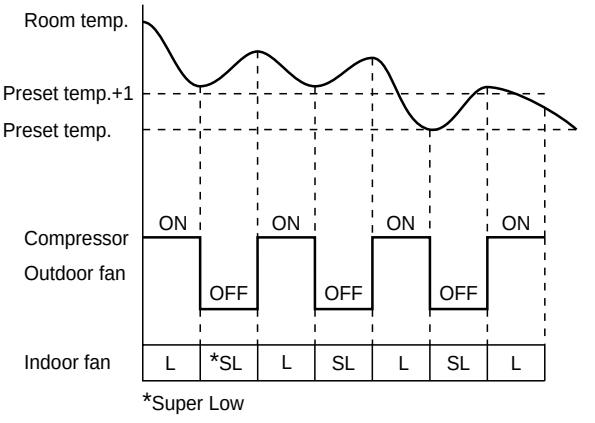


Fig. 7-2-5

(3) [FAN] button on the remote control is set to AUTO only.

(4) The Hi POWER, ECO, COMFORT SLEEP and QUIET operations cannot be set.

7-2-4. Heating operation *Heat pump model only ([MODE] button on the remote control is set to the heating operation.)

(1) The compressor, 4-way valve, outdoor fan and operation display on the remote control are controlled as shown in Fig. 7-2-6.

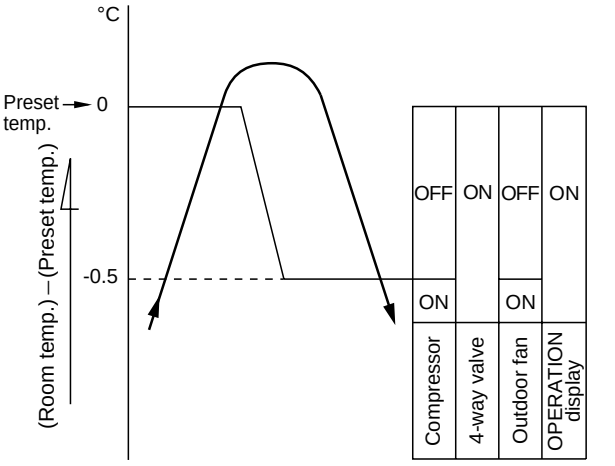
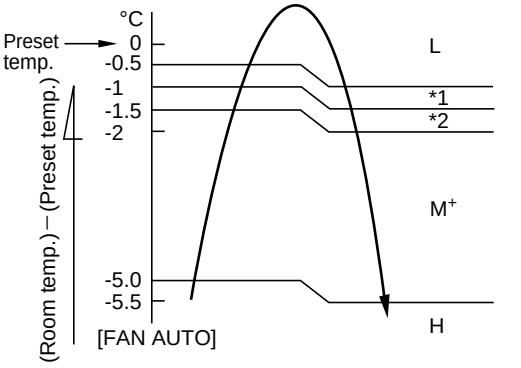


Fig. 7-2-6

(2) When [FAN] button is set to AUTO, the indoor fan motor operates as shown in Fig. 7-2-7. When [FAN] button is set to LOW, LOW$^+$, MED, MED$^+$ or HIGH, the motor operates with a constant air flow.



*1, *2 : The values marked with *1 and *2 are calculated and controlled by the difference in motor speed between M+ and L.

Fig. 7-2-7 Setting of air flow [FAN:AUTO]

(3) The indoor heat exchanger restricts revolving speed of the fan motor to prevent a cold draft. The upper limit of the revolving speed is shown in Fig. 7-2-8 and Table 7-2-1.

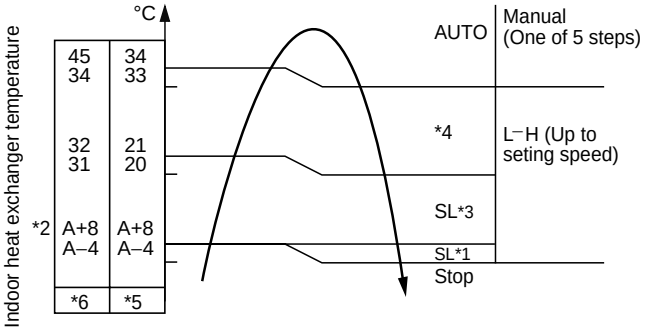


Fig. 7-2-8 Cold draft preventing control

NOTES :

*1: The fan stops for 2 minutes after thermostat-OFF

*2: A is 24 °C when the preset temperature is 24 °C or more and A is the preset temperature when it is under 24 °C.

*3: SL means Super Low.

*4: Calculated from difference in motor speed between SL and H.

*5 and *6:

Fan speed	*5 Starting period	*6 Stabilized period
AUTO	• Up until 12 minutes passed after starting the unit • From 12 to 25 minutes passed after starting the unit and room temperature is 3 °C lower than preset • temperature	• From 12 to 25 minutes passed after starting the unit and room temperature is between preset temperature and 3 °C lower than preset temperature • 25 minutes or more passed after starting the unit
Manual (L – H)	• Room temperature < Preset temperature −4 °C	• Room temperature ≧ Preset temperature −3.5 °C

Table 7-2-1

7-2-5. Automatic operation
([MODE] button on the remote control is set to the automatic operation.)

(1) One of 3 operations (Cooling, Fan only or Heating) is selected according to difference between the preset temperature and the room temperature at which the automatic operation has started, as shown in Fig. 7-2-9. The Fan only operation continues until the room temperature reaches a level at which another mode is selected.

(2) Temporary Auto
When the [RESET] button on the indoor unit is pushed, the preset temperature is fixed at 24 °C and the indoor unit is controlled as shown in Fig. 7-2-9.

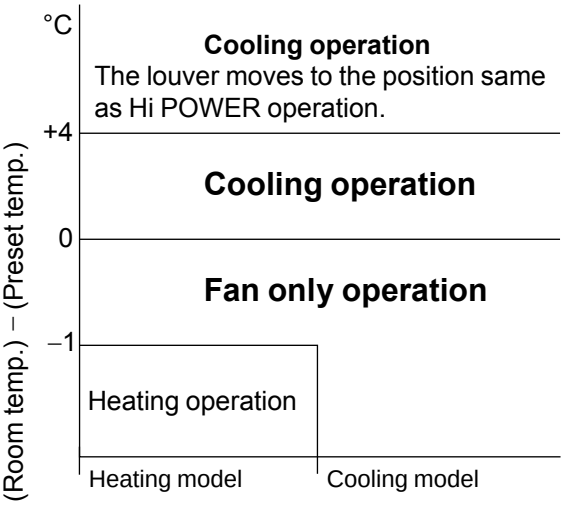


Fig. 7-2-9

7-3. Hi POWER Mode ([Hi POWER] button on the remote control is pressed.)

When [Hi POWER] button is pressed while the indoor unit is in Auto, Cooling or Heating operation, Hi POWER mark is indicated on the display of the remote control and the unit operates as follows.

(1) Automatic operation
- The indoor unit operates in according to the current operation.

(2) Cooling operation
- The setting temperature drops 3°C. (The value of the setting temperature on the remote control does not change.)
- If the room temperature is higher than the setting temperature by 3.5°C or more, the horizontal louver moves to the Hi POWER position automatically. Then when the room temperature is 1°C less than the setting temperature the horizontal louver returns automatically.
- FAN speed : [AUTO]
  If the room temperature is higher than the setting temperature by 3.5°C or more, the air conditioner operates at maximum airflow level.
  If the room temperature is higher than the setting temperature by less than 3.5°C, the air conditioner operates at normal airflow level.
- FAN speed : One of 5 levels
  If the room temperature is higher than the setting temperature by 3.5°C or more, the air conditioner operates at higher consecutive airflow level. If the room temperature is higher than the setting temperature by less than 3.5°C, the air conditioner operates at normal airflow level.

(3) Heating operation (Heat pump model)
- The preset temperature increases 2 °C, (The value of the preset temperature on the remote control does not change.)
- The indoor unit operates in normal heating mode except the preset temperature is higher (+2 °C).

(4) The Hi POWER mode can not be set in Dry or Fan only operation.

7-4. High-Temperature Limit Control *Heat pump model only

The microcontroller detects the indoor heat exchanger temperature to prevent pressure of a refrigerating cycle from increasing excessively.
The compressor and outdoor fan motor are controlled as shown in Fig. 7-4-1.

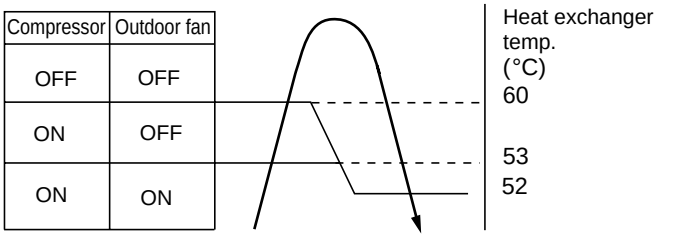


Fig. 7-4-1

7-5. Low-Temperature Limit Control

The microcontroller detects the indoor heat exchanger temperature to prevent the indoor heat exchanger from freezing.
The compressor and outdoor fan motor are controlled as shown in Fig. 7-5-1

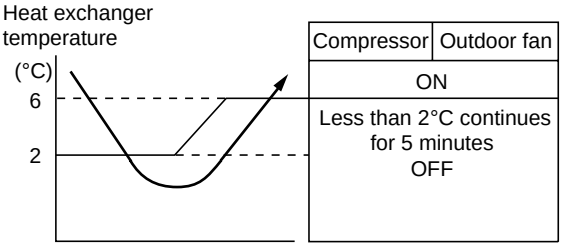


Fig. 7-5-1

7-6. Defrost Operation *Heat pump model only

During the heating operation, the outdoor heat exchanger temperature goes down and sometimes it is frozen.
In this case, the air conditioner stops the heating operation and starts the defrost operation to melt ice.

7-6-1. Condition to start the defrost operation

The defrost operation starts whichever below conditions are satisfied.

(1) When the cumulative compressor operating time is longer than 40 or 90 minutes and difference between the indoor heat exchanger temperature and the room temperature is less than the specified value. (This value is decided by the microprocessor.) (Control example is shown in Fig. 7-6-1. In case of B or C, the defrost operation starts.)

(2) When the current limit control or the high temperature limit control is performed for total of 90 minutes.

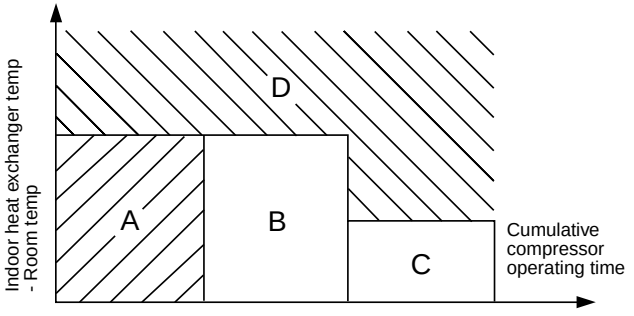


Fig. 7-6-1 (Indoor fan speed : M)

7-6-2. Defrost operation time control

<In case of B>

(1) The heating operation is performed for at least 40 minutes.

(2) The maximum defrost operating time is 6 minutes. The defrost operating time for the 4th cycle is 10 minutes. (When the outdoor temperature is very low, however, the defrost operating time is 10 minutes.)

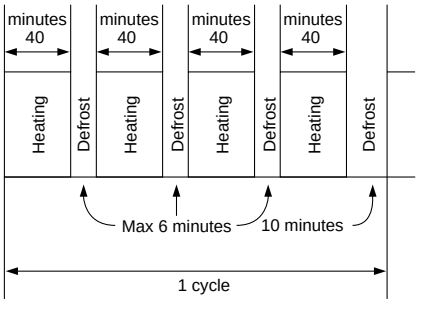


Fig. 7-6-2

<In case of C>

(1) The heating operation is performed for at least 90 minutes.

(2) The defrost operating time is 10 minutes.

7-6-3. Ending condition at defrost operation

(1) When the compressor current becomes 7.5A or more during defrost operation, the defrost operation stops and the heating operation restarts. (The current sensor detects the compressor current.)

(2) The defrost operation continues for at most 6 minutes or 10 minutes.

DEFROST LAMP :

- During defrost operation, the PRE-DEF. lamp is on and the indoor and outdoor fans are off.
- The compressor start protection timer is inter-looked with the PRE-DEF. lamp. So the PRE-DEF. Lamp is off (the fans stop) for about 3 minutes after the [⏻] button is turned on. When the compressor is turned on, the PRE-DEF. lamp comes on. After the heat ex-changer is preheated to about 24°C or higher, the PRE-DEF. Lamp goes off, and the indoor fan starts.

7-7. Current Limit Control *Heat pump model only

The microcontroller detects the input current so as to prevent it exceeds a specified value by means of controlling the outdoor fan control as described in (1) and (2).

(1) Current limit control (Cooling operation)

Control is performed as shown below by detecting the compressor operating current with a current sensor (C.T).

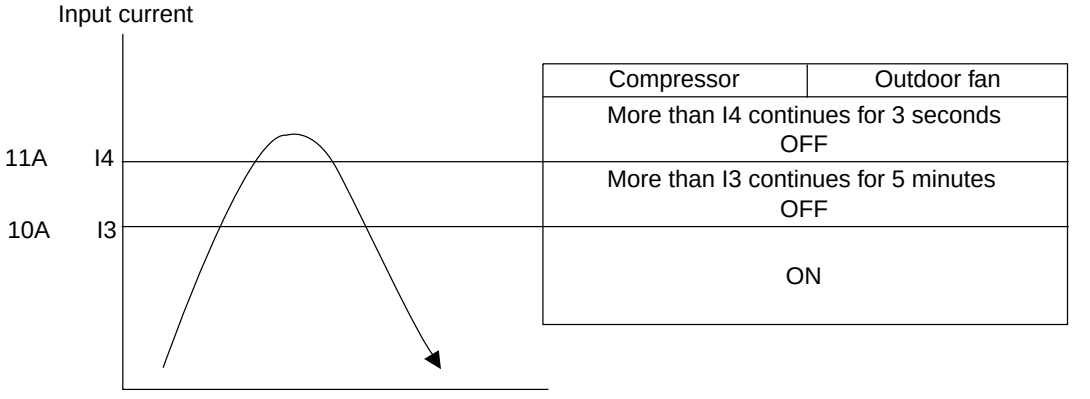


Fig. 7-7-1

(2) Current limit control (Heating operation)

Control is performed as shown in Fig. 7-7-2

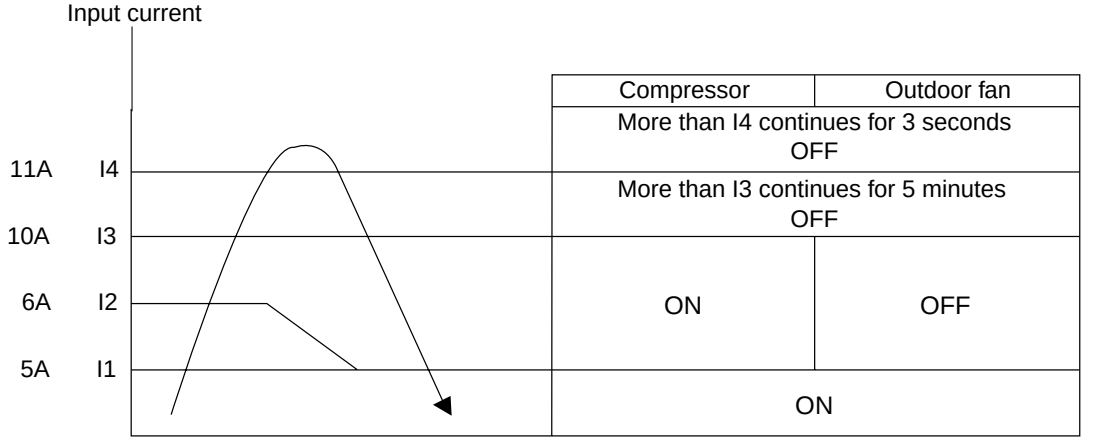


Fig. 7-7-2

Remark : This function is available only for heat pump model (Cooling models have no a current sensor (C.T.)).

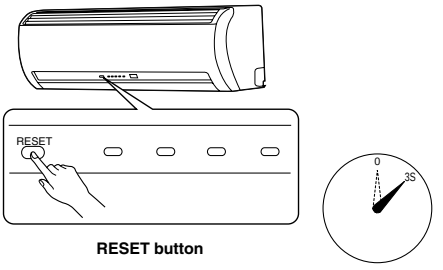
7-8. Auto Restart Function

The indoor unit is equipped with an automatic restarting function which allows the unit to restart operating with the set operating conditions in the event of power supply being accidentally shut down. The operation will resume without warning three minutes after power is restored.
This function is not set to work when shipped from the factory. Therefore it is necessary to set it to work.

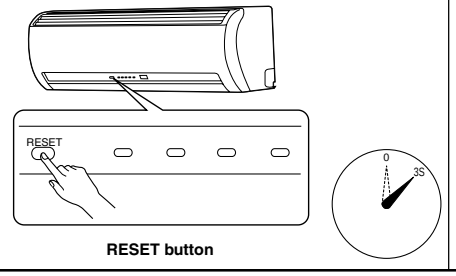
7-8-1. How to set auto restart function

To set the auto restart function, proceed as follows:
The power supply to the unit must be on; the function will not set if the power is off.
Push the [RESET] button located in the center of the front panel continuously for three seconds.
The unit receives the signal and beeps three times.
The unit then restarts operating automatically in the event of power supply being accidentally shut down.

When the unit is on standby (Not operating)

Operation	Motions
Push [RESET] button for more than three seconds.  RESET button	The unit is on standby. ↓ The unit starts to operate. The green lamp is on. ↓ After approx. three seconds, The unit beeps three times and continues to operate. The lamp changes from green to orange. If the unit is not required to operate at this time, push [RESET] button once more or use the remote control to turn it off.

When the unit is in operation

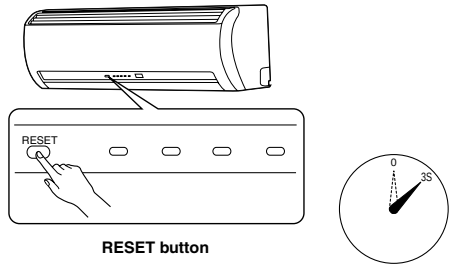
Operation	Motions
Push [RESET] button for more than three seconds.  RESET button	The unit is in operation. The green lamp is on. ↓ The unit stops operating. The green lamp is turned off. ↓ After approx. three seconds, The unit beeps three times If the unit is required to operate at this time, push [RESET] button once more or use the remote control to turn it on.

- While this function is being set, if the unit is in operation, the orange lamp is on.
- This function can not be set if the timer operation has been selected.
- When the unit is turned on by this function, the louver will not swing even though it was swinging automatically before shutting down.
- While the filter check lamp is on, the [RESET] button has the function of filter reset button.

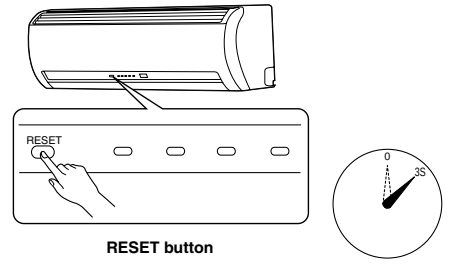
7-8-2. How to cancel auto restart function

To cancel auto restart function, proceed as follows:
Repeat the setting prodedure: the unit receives the signal and beeps three times.
The unit will be required to be turned on with the remote control after the main power supply is turned off.

When the unit is on standby (Not operating)

Operation	Motions
Push [RESET button for more than three seconds.  RESET button	The unit is on standby. ↓ The unit starts to operate. The orange lamp is on. ↓ After approx. three seconds, The unit beeps three times and continues to operate. The lamp changes from orange to green. If the unit is not required to operate at this time, push [RESET] button once more or use the remote control to turn it off.

When the unit is in operation

Operation	Motions
Push [RESET] button for more than three seconds.  RESET button	The unit is in operation. The orange lamp is on. ↓ The unit stops operating. The orange lamp is turned off. ↓ After approx. three seconds, The unit beeps three times If the unit is required to operate at this time, push [RESET] button once more or use the remote control to turn it on.

- While this function is being set, if the unit is in operation, the orange lamp is on.

7-8-3. Power failure during timer operation

When the unit is in Timer operation, if it is turned off because of power failure, the timer operation is cancelled. Therefore, set the timer operation again.

7-9. Filter Check Lamp

When the elapsed time reaches 1000 hours, the filter check lamp indicates. After cleaning the filters, turn off the filter check lamp.

7-9-1. How to turn off filter check lamp

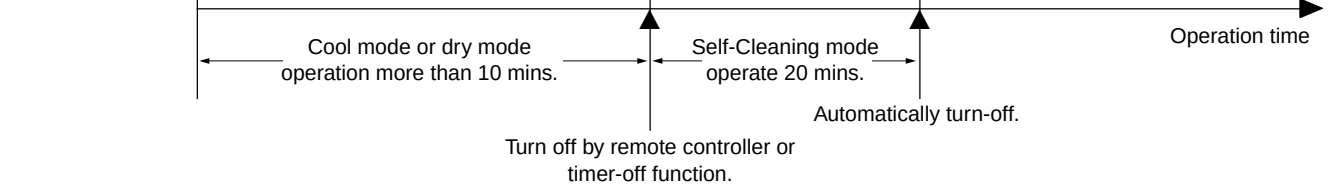
Push [RESET] button on the indoor unit.

Note:
If [RESET] button is pushed while the filter check lamp is not indicating, the indoor unit will start the Automatic Operation.

7-10. Self-Cleaning function

Self-Cleaning function is designed to reduce humidity that causes mold to form inside the air conditioning unit. This advanced, efficient system reduces moisture in the coil. When air conditioner is turned off, the internal fan activates and dries the moisture in the coil for 20 minutes, then it turns off automatically.

Operation display	ON	OFF	OFF
FCU fan	ON rpm is depend on presetting.	ON rpm is SL speed.	OFF
FCU louver	OPEN	CLOSE	CLOSE
Timer display	ON or OFF depend on presetting of timer function.	ON	ON or OFF depend on presetting of timer function.
Compressor	ON or OFF depend on presetting per room temperature.	OFF	OFF
CDU fan	ON or OFF depend on presetting per room temperature.	OFF	OFF



- **The Self-Cleaning function is set as default at ex-factory.**
- **Self-Cleaning operation can stop manually by press [⏻] button of the remote control two more time.**

7-10-1. How to cancel Self-Cleaning function

To cancel the Self-Cleaning function, proceed as follows:

- Press [RESET] button one time or use remote control to turn on air conditioner. The OPERATION display will show in orange color (When AUTO-RESTART is ON) or green color (When AUTO-RESTART is OFF).
- Hold down the [RESET] button for more than 20 seconds. (The air conditioner will stop suddenly when the [RESET] button is pressed but keep holding it continue. Then will beep 3 times in the first 3 seconds but it is not related to Self-Cleaning function)
- After holding about 20 seconds, the air conditioner will beep 5 times without any blinking of display.
- The Self-Cleaning Operation had been cancelled.

Remarks

- Per setting of Self-Cleaning function above, AUTO-RESTART function had been cancelled. To set AUTO-RESTART again, please follow item 7-8-1.

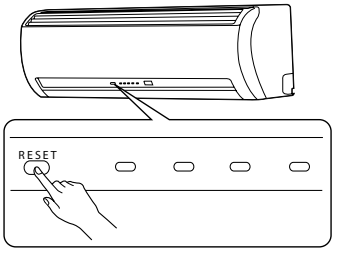
7-10-2. How to set Self-Cleaning function.

To set the Self-Cleaning function, proceed as follows.

- Press [RESET] button one time or use remote control to turn on air conditioner. The OPERATION display will show in orange color (When AUTO-RESET is ON) or green color (When AUTO-RESTART is OFF).
- Hold down the [RESET] button for more than 20 seconds. (The air conditioner will stop suddenly when the [RESET] button is pressed but keep holding it continue. Then will beep 3 times is the first 3 seconds but it is not related to Self-Cleaning function)
- After holding about 20 seconds, the air conditioner will beep 5 times and OPERATION display blinks 5 times.
- The Self-Cleaning function had been set.

Remarks

- Per setting of Self-Cleaning function above, AUTO-RESTART function had been cancelled. To set AUTO-RESTART again, please follow item 7-8-1.



7-11. QUIET Mode

Quiet mode is the system which, control the revolving speed of indoor fan to work constantly at lower than speed L. In addition, noise level of indoor unit is less than usual.

When the [QUIET] button is pressed, the fan of the indoor unit will be restricted the revolving speed at speed L - until the [QUIET] button is pressed once again (cancel Quiet mode).

Remarks :

1. Quiet mode is unable to work in dry mode.
2. Quiet mode is appropriate to work with less cooling load and less heating load condition. Because of the fan speed L- may cause not enough the cooling capacity or heating capacity.

7-12. COMFORT SLEEP mode

The principles of comfort sleep mode are:

- Quietness for more comfortable.
- Save energy by changing room temperature automatically.
- The air condition can shut down by itself automatically.

Remarks:

1. Comfort sleep mode will not operate in dry mode and fan only mode.
2. Comfort sleep mode is appropriate to work with less cooling load and less heating load condition. Because of the fan speed L- may cause not enough the cooling capacity or heating capacity.

7-12-1. Cooling mode

- The fan speed of indoor unit operates automatically, it relates with the compressor's operation.

Compressor's Operation	Fan Speed
ON	L-
OFF	SL

- The preset temperature will increase 1°C after the Comfort sleep mode has operated for 1 hour and the temperature will increase another 1°C after the comfort sleep mode has operated for 2 hour. (The value of the preset temperature on the remote control does not change.)
- Press the [COMFORT SLEEP] button to choose the operating hours. Repeat pressing to select the hours. (1hr, 3hr, 5hr or 9hr)
- If the [COMFORT SLEEP] button is pressed again means cancel comfort sleep mode.

7-12-2. Heating mode

- The fan speed of indoor unit operates automatically, it relates with the compressor's operation.

Compressor's Operation	Fan Speed
ON	L-
OFF	SL

- The preset temperature will drop down 1°C after the comfort sleep mode has operated for 1 hour and the temperature will decrease another 1°C after the comfort sleep mode has operated for 2 hour. (The value of the preset temperature on the remote control. dose not change.)
- Press the [COMFORT SLEEP] button to choose the operating hours. Repeat pressing to select the hours. (1hr, 3hr, 5hr or 9 hr)
- If the [COMFORT SLEEP] button is pressed again means cancel comfort sleep mode.

8. INSTALLATION PROCEDURE

8-1. Safety Cautions

For general public use

Power supply cord of parts of appliance for Outdoor use shall be at least polychloroprene sheathed flexible cord (design H07 RN-F), or cord designation 245 IEC66.

CAUTION **New Refrigerant Air conditioner Installation**

- **THIS AIR CONDITIONER USES THE NEW HFC REFRGERANT (R410A), WHICH DOES NOT DESTROY THE OZONE LAYER.**

R410A refrigerant is apt to be affected by impurity such as water, oxidizing membranes, and oils because the pressure of R410A refrigerant is approx. 1.6 times of refrigerant R22. As well as the adoption of this new refrigerant, refrigerating machine oil has also been changed. Therefore, during installation work, be sure that water, dust, former refrigerant, or refrigerating machine oil does not enter into the refrigerating cycle of a new-refrigerant air conditioner.
To avoid mixing refrigerant and refrigerating machine oil, the sizes of charging port connecting sections on the main unit are different from those for the conventional refrigerant, and different size tools are also required. Accordingly, special tools are required for the new refrigerant (R410A) as shown below. For connecting pipes, use new and clean piping materials with high-pressure withstand capabilities, designed for R410A only, and ensure that water or dust does not enter. Moreover, do not use any existing piping as its pressure withstand may be insufficient, and may contain impurities.

CAUTION **To Disconnect the Appliance from the Main Power Supply**

This appliance must be connected to the main power supply by means of a circuit breaker or a switch with a contact separation of at least 3 mm.
If this is not possible, a power supply plug with earth must be used. This plug must be easily accessible after installation. The plug must be disconnected from the power supply socket in order to disconnect the appliance completely from the mains.

DANGER

- FOR USE BY QUALIFIED PERSONS ONLY.
- TURN OFF MAIN POWER SUPPLY BEFORE ATTEMPTING ANY ELECTRICAL WORK. MAKE SURE ALL POWER SWITCHES ARE OFF. FAILURE TO DO SO MAY CAUSE ELECTRIC SHOCK.
- CONNECT THE CONNECTING CABLE CORRECTLY. IF THE CONNECTING CABLE IS CONNECTED WRONGLY, ELECTRIC PARTS MAY BE DAMAGED.
- CHECK THE EARTH WIRE THAT IT IS NOT BROKEN OR DISCONNECTED BEFORE INSTALLATION.
- DO NOT INSTALL NEAR CONCENTRATIONS OF COMBUSTIBLE GAS OR GAS VAPORS. FAILURE TO FOLLOW THIS INSTRUCTION CAN RESULT IN FIRE OR EXPLOSION.
- TO PREVENT OVERHEATING THE INDOOR UNIT AND CAUSING A FIRE HAZARD, PLACE THE UNIT WELL AWAY (MORE THAN 2 M) FROM HEAT SOURCES SUCH AS RADIATORS, HEATORS, FURNACE, STOVES, ETC.
- WHEN MOVING THE AIR-CONDITIONER FOR INSTALLING IT IN ANOTHER PLACE AGAIN, BE VERY CAREFUL NOT TO GET THE SPECIFIED REFRIGERANT (R410A) WITH ANY OTHER GASEOUS BODY INTO THE REFRIGERATION CYCLE. IF AIR OR ANY OTHER GAS IS MIXED IN THE REFRIGERANT, THE GAS PRESSURE IN THE REFRIGERATION CYCLE BECOMES ABNORMALLY HIGH AND IT RESULTINGLY CAUSES BURST OF THE PIPE AND INJURIES ON PERSONS.
- IN THE EVENT THAT THE REFRIGERANT GAS LEAKS OUT OF THE PIPE DURING THE INSTALLATION WORK, IMMEDIATELY LET FRESH AIR INTO THE ROOM. IF THE REFRIGERANT GAS IS HEATED BY FIRE OR SOMETHING ELSE, IT CAUSES GENERATION OF POISONOUS GAS.

WARNING

- Never modify this unit by removing any of the safety guards or bypassing any of the safety interlock switches.
- Do not install in a place which cannot bear the weight of the unit. Personal injury and property damage can result if the unit falls.
- Before doing the electrical work, attach an approved plug to the power supply cord. Also, make sure the equipment is properly earthed.
- Appliance shall be installed in accordance with national wiring regulations. If you detect any damage, do not install the unit. Contact your TOSHIBA dealer immediately.

CAUTION

- Exposure of unit to water or other moisture before installation could result in electric shock. Do not store it in a wet basement or expose to rain or water.
- After unpacking the unit, examine it carefully for possible damage.
- Do not install in a place that can increase the vibration of the unit. Do not install in a place that can amplify the noise level of the unit or where noise and discharged air might disturb neighbors.
- To avoid personal injury, be careful when handling parts with sharp edges.
- Please read this installation manual carefully before installing the unit. It contains further important instructions for proper installation.

REQUIREMENT OF REPORT TO THE LOCAL POWER SUPPLIER

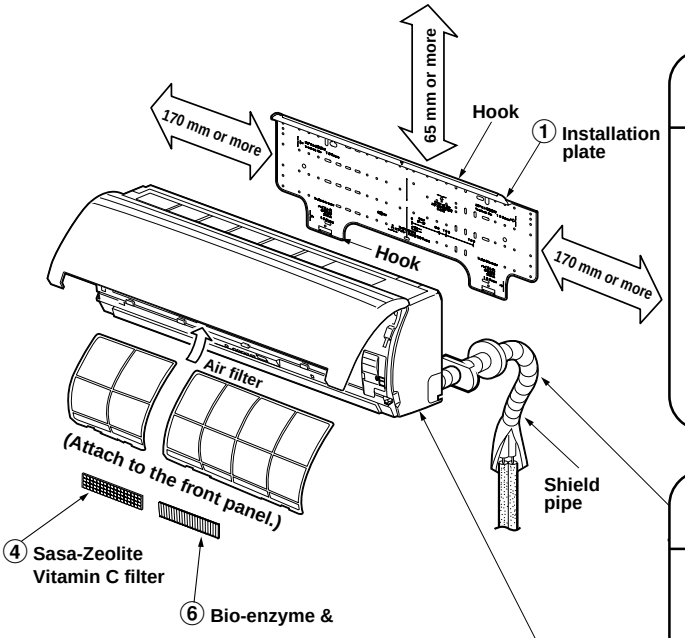
Please make absolutely sure that the installation of this appliance is reported to the local power supplier before installation. If you experience any problems, or if the installation is not accepted by the supplier, the service agency will take adequate countermeasures.

Remark per EMC Directive 89/336/EEC

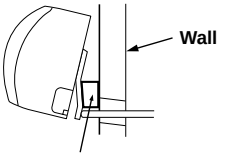
To prevent flicker impressions during the start of the compressor (technical process) following installation conditions do apply.

1. The power connection for the air conditioner has to be done at the main power distribution. This distribution has to be of an impedance.
   Normally the required impedance is reached at a 32A fusing point. Air conditioner fuse has to be 16A max.!
2. No other equipment should be connected to this power line.
3. For detailed installation acceptance, please contact your power supplier whether its restriction does apply for products like washing machines, air conditioners or electrical ovens.
4. For power details of the air conditioner, refer to the rating plate of the product.

8-2. Installation Diagram of Indoor and Outdoor Units

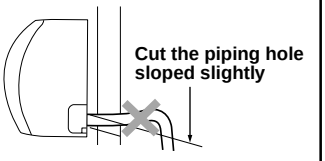


For the rear left and left piping



Insert the cushion between the indoor unit and wall, and tilt the indoor unit for better operation.

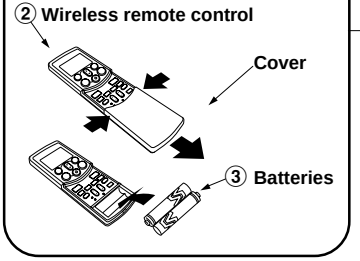
Do not allow the drain hose to get slack.

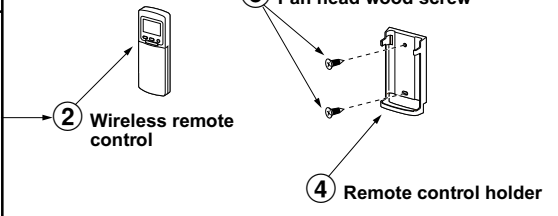


Make sure to run the drain hose sloped downward.

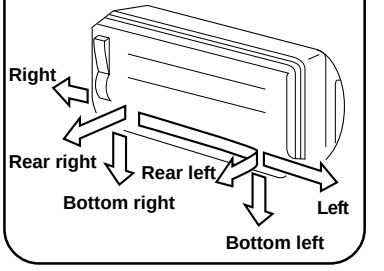
Before installing the wireless remote control

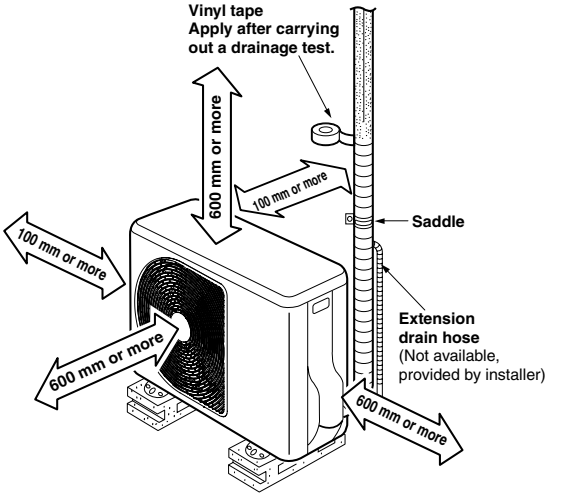
- With the remote control cover open, load the batteries supplied correctly, observing their polarity.



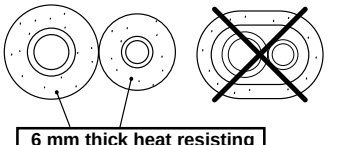


The auxiliary piping can be connected the left, rear left, rear right, right, bottom right or bottom left.





Insulate the refrigerant pipes separately with insulation, not together.



8-3. Installation

8-3-1. Optional installation parts

Part Code	Parts name	Q'ty
Ⓐ	Refrigerant piping Liquid side : ∅6.35 mm Gas side : ∅12.7 mm	One each
Ⓑ	Pipe insulating material (polyethylene foam, 6 mm thick)	1
Ⓒ	Putty, PVC tapes	One each

<Fixing bolt arrangement of outdoor unit>

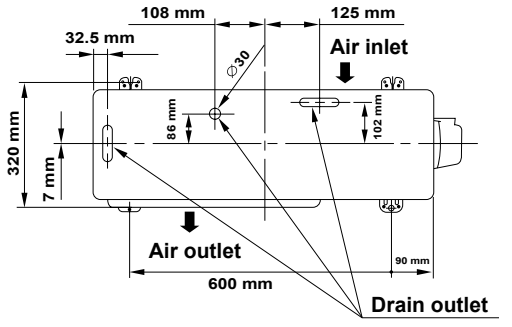
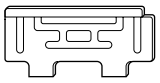
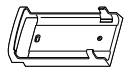
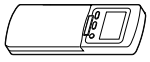
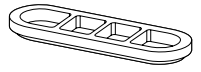


Fig. 8-3-1

- Secure the outdoor unit with fixing bolts and nuts if the unit is likely to be exposed to a strong wind.
- Use ∅8 mm or ∅10 mm anchor bolts and nuts.
- If it is necessary to drain the defrost water, attach ⑨ drain nipple and ⑩ cap water proof to the bottom plate of the outdoor unit before installing it.

8-3-2. Accessory and installation parts

Part No.	Part name (Q'ty)	Part No.	Part name (Q'ty)	Part No.	Part name (Q'ty)
①	 Installation plate x 1	④	 Remote control holder x 1	⑦	Mounting screw ∅4 x 25 ℓ x 6
②	 Wireless remote control x 1	⑤	Sasa-Zeolite Vitamin C filter x 1	⑧	Pan head wood screw ∅3.1 x 16 ℓ x 2
③	Battery x 2	⑥	Bio-enzyme & Gingko filter x 1	⑨	Drain nipple* x 1 (For Heat pump model only)
				⑩	 Cap water proof* x 2 (For Heat pump model only)

Others

Name
Owner's manual
Installation manual

The part marked with asterisk (*) is packaged with the outdoor unit.

8-3-3. Installation/Servicing tools

<Changes in the product and components>

In the case of an air conditioner using R410A, in order to prevent any other refrigerant from being charged accidentally, the service port diameter of the outdoor unit control valve (3 way valve) has been changed. (1/2 UNF 20 threads per inch)

- In order to increase the pressure withstand strength of the refrigerant piping, flare processing diameter and size of opposite side of flare nuts have been changed. (for copper pipes with nominal dimensions 1/2 and 5/8)

New tools for R410A	Applicable to R22 model		Changes
Gauge manifold	×		As pressure is high, it is impossible to measure by means of conventional gauge. In order to prevent any other refrigerant from being charged, each port diameter has been changed.
Charge hose	×		In order to increase pressure withstand strength, hose materials and port size have been changed (to 1/2 UNF 20 threads per inch). When purchasing a charge hose, be sure to confirm the port size.
Electronic balance for refrigerant charging	○		As pressure is high and gasification speed is fast, it is difficult to read the indicated value by means of a charging cylinder, as air bubbles occur.
Torque wrench (nominal dia. 1/2, 5/8)	×		The size of opposing flare nuts has been increased. Incidentally, a common wrench is used for nominal diameters 1/4 and 3/8.
Flare tool (clutch type)	○		By increasing the clamp bar's receiving hole, strength of spring in the tool has been improved.
Gauge for projection adjustment	—		Used when flare is made with a conventional flare tool.
Vacuum pump adapter	○		Connected to conventional vacuum pump. It is necessary to use an adapter to prevent vacuum pump oil from flowing back to the charge hose. The charge hose connecting part has two ports: one for conventional refrigerant (7/16 UNF 20 threads per inch) and one for R410A. If the vacuum pump mineral oil mixes with R410A, a sludge may occur and damage the equipment.
Gas leakage detector	×		Exclusive for HFC refrigerant.

- Incidentally, the "refrigerant cylinder" comes with the refrigerant designation (R410A) and protector coating in the U. S ARI specified rose color (ARI color code: PMS 507).
- Also, the "charge port and packing for refrigerant cylinder" require 1/2 UNF 20 threads per inch corresponding to the port size of the charge hose.

8-4. Indoor Unit

8-4-1. Installation place

- A place which provides the spaces around the indoor unit as shown in the above diagram.
- A place where there is no obstacle near the air inlet and outlet.
- A place that allows easy installation of the piping to the outdoor unit.
- A place which allows the front panel to be opened.

CAUTION

- Direct sunlight to the indoor unit's wireless receiver should be avoided.
- The microprocessor in the indoor unit should not be too close to RF noise sources. (For details, see the owner's manual.)

<Remote control>

- A place where there are no obstacles such as a curtain that may block the signal from the indoor unit.
- Do not install the remote control in a place exposed to direct sunlight or close to a heating source, such as a stove.
- Keep the remote control at least 1 m apart from the nearest TV set or stereo equipment. (This is necessary to prevent image disturbances or noise interference.)
- The location of the remote control should be determined as shown below.

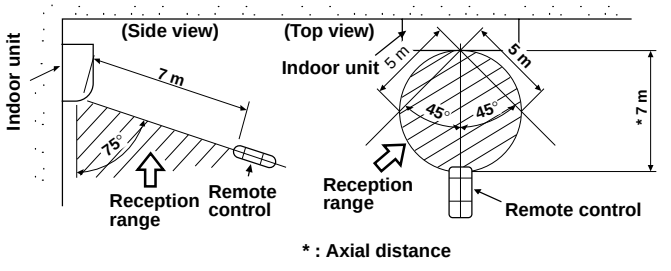


Fig. 8-4-1

8-4-2. Cutting a hole and mounting installation plate

<Cutting a hole>

When installing the refrigerant pipes from the rear.

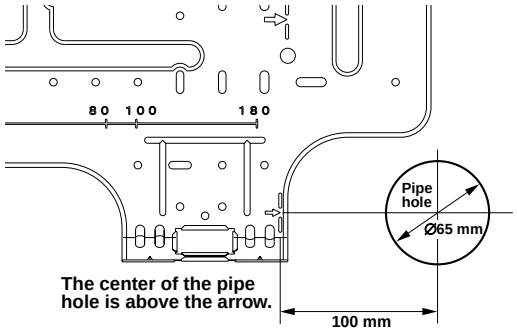


Fig. 8-4-2

1. After determining the pipe hole position on the mounting plate (➡), drill the pipe hole (∅65 mm) at a slight downward slant to the outdoor side.

NOTE

- When drilling a wall that contains a metal lath, wire lath or metal plate, be sure to use a pipe hole brim ring sold separately.

<Mounting the installation plate>

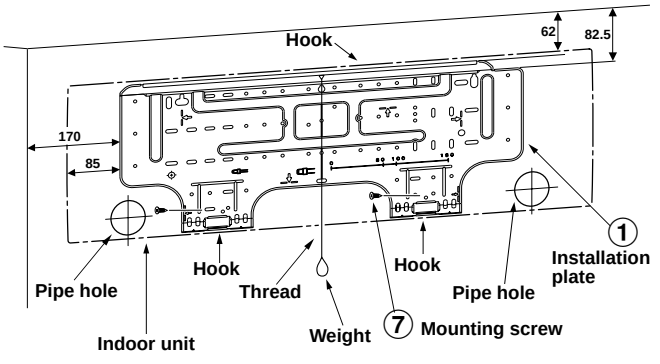


Fig. 8-4-3

<When the installation plate is directly mounted on the wall>

1. Securely fit the installation plate onto the wall by screwing it in the upper and lower parts to hook up the indoor unit.
2. To mount the installation plate on a concrete wall with anchor bolts, utilize the anchor bolt holes as illustrated in the above figure.
3. Install the installation plate horizontally in the wall.

CAUTION

When installing the installation plate with a mounting screw, do not use the anchor bolt hole. Otherwise the unit may fall down and result in personal injury and property damage.

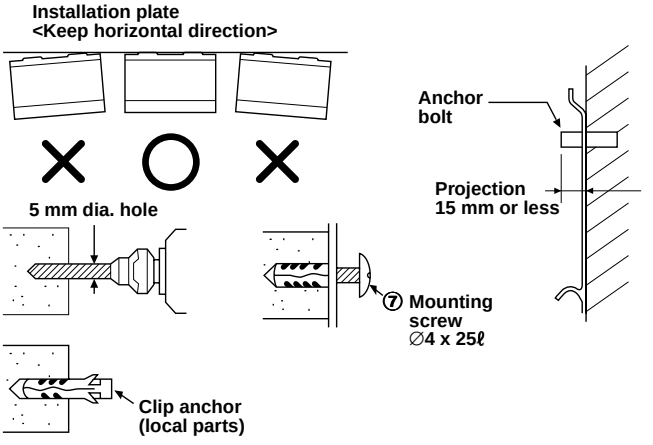


Fig. 8-4-4

CAUTION

Failure to firmly install the unit may result in personal injury and property damage if the unit falls.

- In case of block, brick, concrete or similar type walls, make 5 mm dia. holes in the wall.
- Insert clip anchors for appropriate ⑦ mounting screws.

NOTE

- Secure four corners and lower parts of the installation plate with 4 to 6 mounting screws to install it.

8-4-3. Electrical work

1. The supply voltage must be the same as the rated voltage of the air conditioner.
2. Prepare the power source for exclusive use with the air conditioner.

CAUTION

- This appliance can be connected to the mains in either of the following two ways.
  (1) Connection to fixed wiring:
  A switch or circuit breaker which disconnects all poles and has a contact separation of at least 3 mm must be incorporate in the fixed wiring. An approved circuit breaker or switches must used.
  (2) Connection with power supply plug:
  Attach power supply plug with power cord and plug it into wall outlet. An approved power supply cord and plug must be used.

NOTE

- Ensure all wiring is used within its electrical rating.

Model	**RAS-13GKHP-ES2 RAS-13GKP-ES2 RAS-13NKHP-AS2 RAS-13NKP-AS2**
Power source	50 Hz, 220 – 240 V Single phase
Maximum running current	12A
Plug socket & fuse rating	16A
Power cord	1.3 mm^2 or more

<How to connect the connecting cable>

Wiring of the connecting cable can be carried out without removing the front panel.

1. Remove the air inlet grille.
   Open the air inlet grille upward and pull it toward you.
2. Remove the terminal cover and cord clamp.
3. Insert the connecting cable (according to the local cords) into the pipe hole on the wall.
4. Take out the connecting cable through the cable slot on the rear panel so that it protrudes about 15 cm from the front.
5. Insert the connecting cable fully into the terminal block and secure it tightly with screws.
6. Tightening torque : 1.2 N·m (0.12 kgf·m)
7. Secure the connecting cable with the cord clamp.
8. Fix the terminal cover, rear plate bushing and air inlet grille on the indoor unit.

CAUTION

- Be sure to refer to the wiring system diagram labeled inside the front panel.
- Check local electrical cords and also any specific wiring instructions or limitations.

For Heat pump

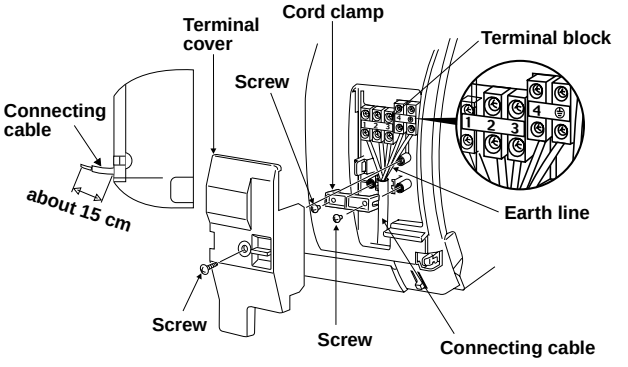
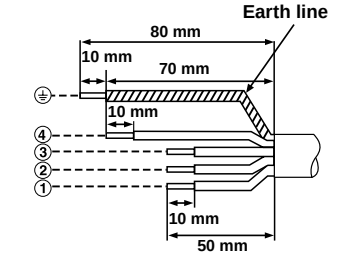


Fig. 8-4-5



Stripping length of the connecting cable

Fig. 8-4-6

For Cooling

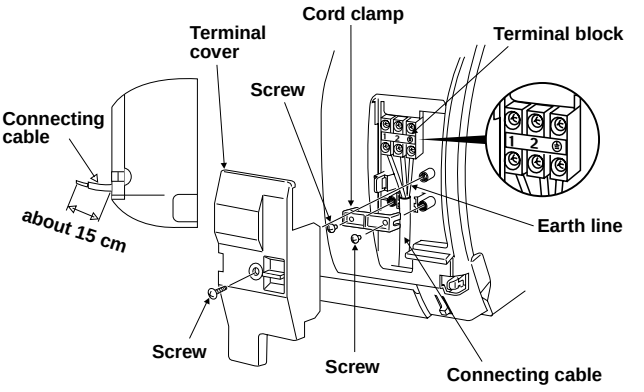
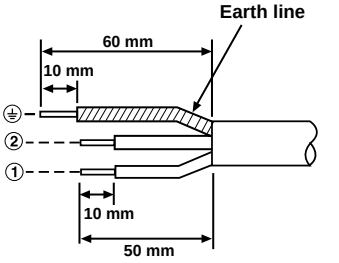


Fig. 8-4-7



Stripping length of the connecting cable

Fig. 8-4-8

NOTE

- Use stranded wire only.
- Wire type : H07 RN-F or more

<How to install the air inlet grille on the indoor unit>

- When attaching the air inlet grille, the contrary of the removed operation is performed.

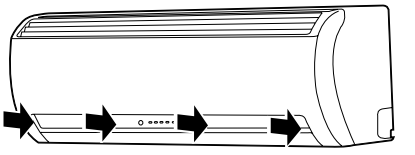
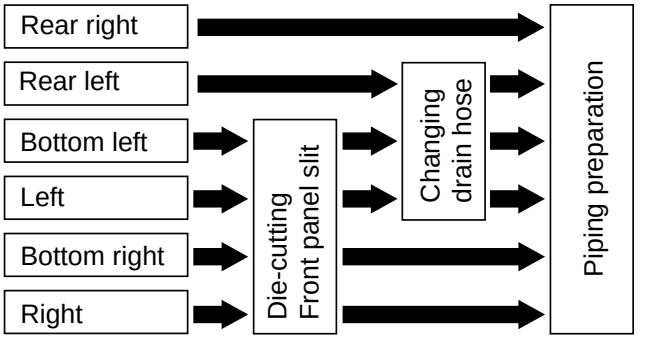


Fig. 8-4-9

8-4-4. Piping and drain hose installation

<Piping and drain hose forming>

* Since dewing results in a machine trouble, make sure to insulate both the connecting pipes. (Use polyethylene foam as insulating material.)



1. Die-cutting Front panel slit

For leftward connection, cut out slit on the left side of the front panel. (A knife will produce splinters, so use nippers.)

2. Changing drain hose

For leftward connection, bottom leftward connection and rear leftward connection's piping, it is necessary to change the drain hose and drain cap.

How to remove the drains cap

Clip drain cap by needle-nose plier, and pull out.

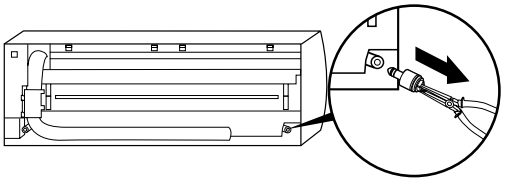


Fig. 8-4-10

How to install the drain hose

Firmly insert drain hose connecting part until hitting on a heat insulator.

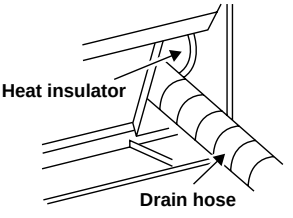


Fig. 8-4-11

How to fix the drains cap

1) Insert hexagonal wrench (4 mm) in a center head.

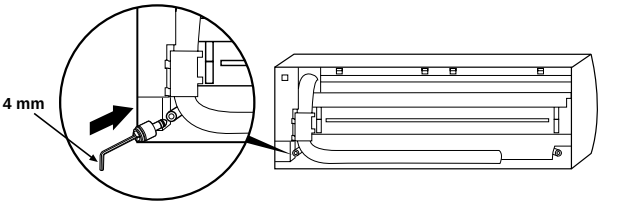


Fig. 8-4-12

2) Firmly insert drains cap.

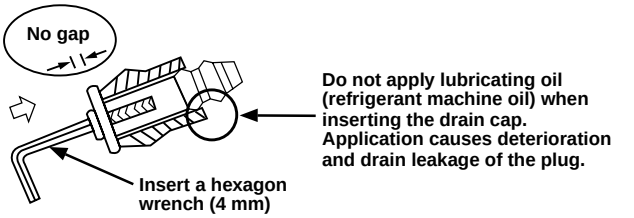

No gap
Do not apply lubricating oil (refrigerant machine oil) when inserting the drain cap. Application causes deterioration and drain leakage of the plug.
Insert a hexagon wrench (4 mm)

Fig. 8-4-13

CAUTION

Firmly insert the drain hose and drain cap; otherwise, water may leak.

<In case of right or left piping>

- After scribing slits of the front panel with a knife or a making-off pin, cut them with a pair of nippers or an equivalent tool.

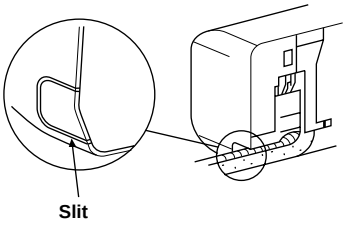


Fig. 8-4-14

<In case of bottom right or bottom left piping>

- After scribing slits of the front panel with a knife or a making-off pin, cut them with a pair of nippers or an equivalent tool.

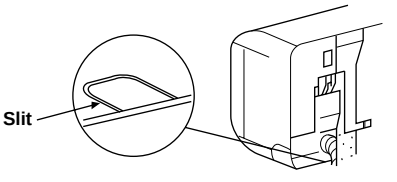


Fig. 8-4-15

<Left-hand connection with piping>

Bend the connecting pipe so that it is laid within 43 mm above the wall surface. If the connecting pipe is laid exceeding 43 mm above the wall surface, the indoor unit may unstably be set on the wall. When bending the connecting pipe, make sure to use a spring bender so as not to crush the pipe.

Bend the connection pipe within a radius of 30 mm.

To connect the pipe after installation of the unit (figure)

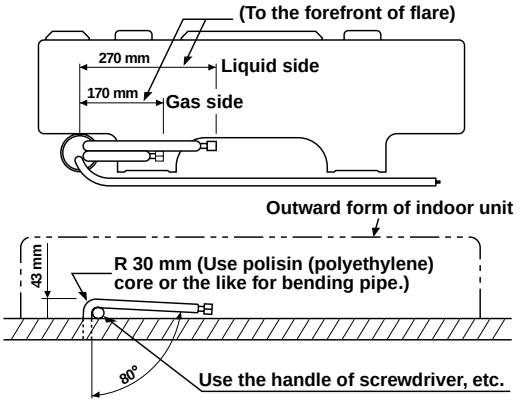

(To the forefront of flare)
270 mm
Liquid side
170 mm
Gas side
Outward form of indoor unit
43 mm
R 30 mm (Use polisin (polyethylene) core or the like for bending pipe.)
80°
Use the handle of screwdriver, etc.

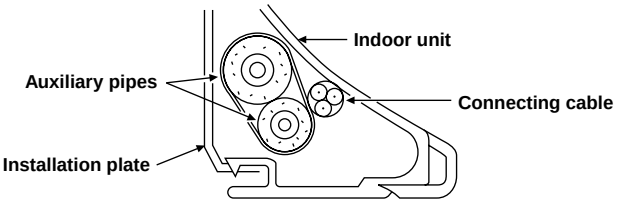
Fig. 8-4-16

NOTE

If the pipe is bent incorrectly, the indoor unit may unstably be set on the wall.
After passing the connecting pipe through the pipe hole, connect the connecting pipe to the auxiliary pipes and wrap the facing tape around them.

CAUTION

- Bind the auxiliary pipes (two) and connecting cable with facing tape tightly. In case of leftward piping and rear-leftward piping, bind the auxiliary pipes (two) only with facing tape.



- Carefully arrange pipes so that any pipe does not stick out of the rear plate of the indoor unit.
- Carefully connect the auxiliary pipes and connecting pipes to each other and cut off the insulating tape wound on the connecting pipe to avoid double-taping at the joint, moreover, seal the joint with the vinyl tape, etc.
- Since dewing results in a machine trouble, make sure to insulate both the connecting pipes. (Use polyethylene foam as insulating material.)
- When bending a pipe, carefully do it, not to crush it.

8-4-5. Indoor unit fixing

1. Pass the pipe through the hole in the wall, and hook the indoor unit on the installation plate at the upper hooks.
2. Swing the indoor unit to right and left to confirm that it is firmly hooked up on the installation plate.
3. While pressing the indoor unit onto the wall, hook it at the lower part on the installation plate. Pull the indoor unit toward you to confirm that it is firmly hooked up on the installation plate.

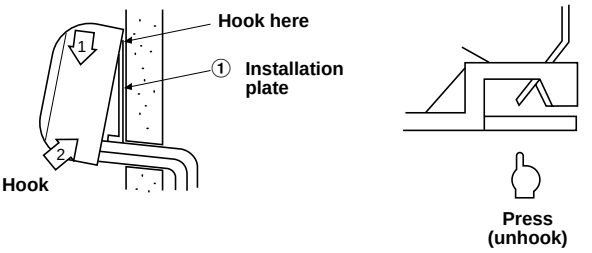


Fig. 8-4-17

- For detaching the indoor unit from the installation plate, pull the indoor unit toward you while pushing its bottom up at the specified parts.

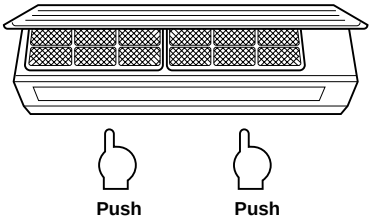


Fig. 8-4-18

8-4-6. Drainage

1. Run the drain hose sloped downwards.

NOTE

- Hole should be made at a slight downward slant on the outdoor side.

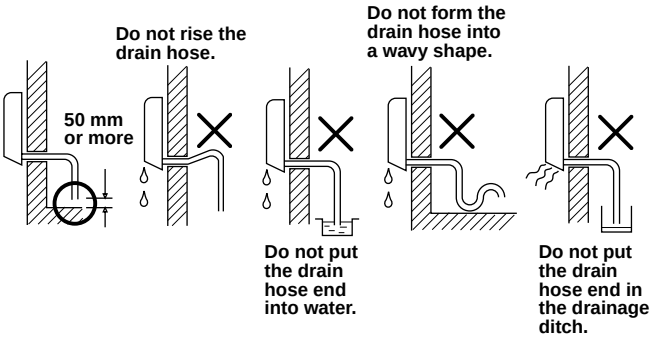

Do not rise the drain hose.
50 mm or more
Do not form the drain hose into a wavy shape.
Do not put the drain hose end into water.
Do not put the drain hose end in the drainage ditch.

Fig. 8-4-19

2. Put water in the drain pan and make sure that the water is drained out of doors.
3. When connecting extension drain hose, insulate the connecting part of extension drain hose with shield pipe.

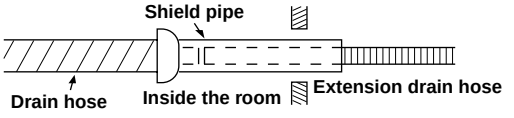


Fig. 8-4-20

CAUTION

Arrange the drain pipe for proper drainage from the unit.
Improper drainage can result in dew-dropping.

This air conditioner has the structure designed to drain water collected from dew, which forms on the back of the indoor unit, to the drain pan.
Therefore, do not store the power cord and other parts at a height above the drain guide.

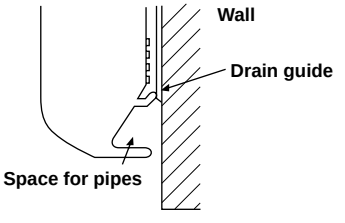


Fig. 8-4-21

8-5. Outdoor Unit

8-5-1. Installation place

- A place which provides the spaces around the outdoor unit as shown in the left diagram.
- A place which can bear the weight of the outdoor unit and does not allow an increase in noise level and vibration.
- A place where the operation noise and discharged air do not disturb your neighbors.
- A place which is not exposed to a strong wind.
- A place free of a leakage of combustible gases.
- A place which does not block a passage.
- When the outdoor unit is to be installed in an elevated position, be sure to secure its feet.
- An allowable length of the connecting pipe is up to 15m
- An allowable height level is up to 6m.
- A place where the drain water does not raise any problem.

CAUTION

1. Install the outdoor unit without anything blocking the air discharging.
2. When the outdoor unit is installed in a place exposed always exposed to strong wind like a coast or on a high storey of a building, secure the normal fan operation using a duct or a wind shield.
3. In particularly windy areas, install the unit such as to avoid admission of wind.
4. Installation in the following places may result in trouble.
   Do not install the unit in such places.
   - A place full of machine oil.
   - A saline-place such as the coast.
   - A place full of sulfide gas.
   - A place where high-frequency waves are likely to be generated as from audio equipment, welders, and medical equipment.

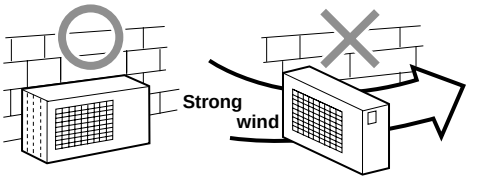


Fig. 8-5-1

8-5-2. Refrigerant piping connection

1. Cut the pipe with a pipe cutter.

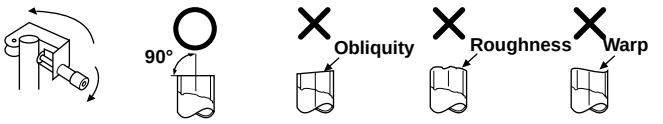


Fig. 8-5-2

2. Insert a flare nut into the pipe, and flare the pipe.
   - **Projection margin in flaring : A (Unit : mm)**

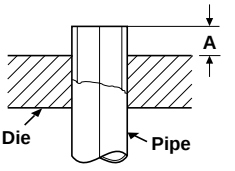


Fig. 8-5-3

Rigid (Clutch type)

Outer dia. of copper pipe	R410A tool used	Conventional tool used
6.6.35	0 to 0.5	1.0 to 1.5
12.70	0 to 0.5	1.0 to 1.5

Imperial (wing nut type, conventional tool)

Outer dia. of copper pipe	R410A
6.35	1.5 to 2.0
12.70	2.0 to 2.5

<Tightening connection>

Align the centers of the connecting pipes and tighten the flare nut as far as possible with your fingers. Then tighten the nut with a spanner and torque wrench as shown in the figure.

CAUTION

- Do not apply excess torque.
- Otherwise, the nut may crack depending on the conditions.

(Unit : N·m)

Outer dia.	Tightening torque
∅6.35	16 to 18 (1.6 to 1.8 kgf·m)
∅12.70	50 to 62 (5.0 to 6.2 kgf·m)

- **Tightening torque of flare pipe connections**

The operating pressure of R410A is higher than that of R22. (Approx. 1.6 times). It is therefore necessary to firmly tighten the flare pipe connecting sections (which connect the indoor and outdoor units) up to the specified tightening torque. Incorrect connections may cause not only a gas leakage, but also damage to the refrigerant cycle.

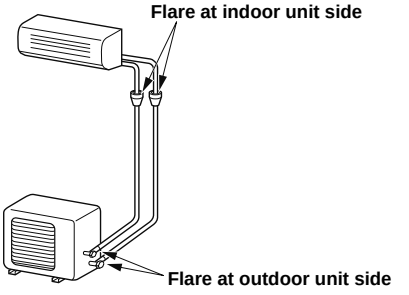


Fig. 8-5-4

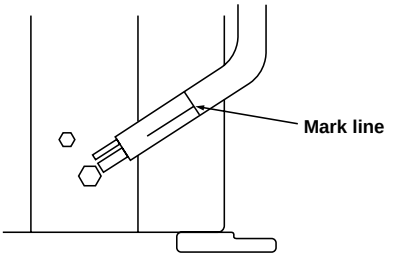


Fig. 8-5-5

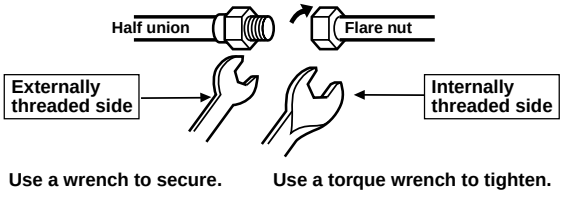


Fig. 8-5-6

CAUTION

- **KEEP IMPORTANT 4 POINTS FOR PIPING WORK**

(1) Take away dust and moisture (Inside of the connecting pipes.)
(2) Tight connection (between pipes and unit)
(3) Evacuate the air in the connecting pipes using VACUUM PUMP.
(4) Check gas leak (connected points)

8-5-3. Evacuating

After the piping has been connected to the indoor unit, you can perform the air purge together at once.

AIR PURGE
Evacuate the air in the connecting pipes and in the indoor unit using
a vacuum pump. Do not use the refrigerant in the outdoor unit.
For details, see the manual of the vacuum pump.

<Using a vacuum pump>

Be sure to use a vacuum pump with counter-flow prevention function so that inside oil of the pump does not flow backward into pipes of the air conditioner when the pump stops. (If oil inside of the vacuum pump enters into the air conditioner, which use R410A, refrigeration cycle trouble may result.)

1. Connect the charge hose from the manifold valve to the service port of the gas side packed valve.
2. Connect the charge hose to the port of the vacuum pump.
3. Open fully the low pressure side handle of the gauge manifold valve.
4. Operate the vacuum pump to start evacuating. Perform evacuating for about 15 minutes if the piping length is 20 meters. (15 minutes for 20 meters) (assuming a pump capacity of 27 liters per minute.) Then confirm that the compound pressure gauge reading is –101 kPa (–76 cmHg).
5. Close the low pressure side valve handle of gauge manifold.
6. Open fully the valve stem of the packed valves (both sides of Gas and Liquid).
7. Remove the charging hose from the service port.
8. Securely tighten the caps on the packed valves.

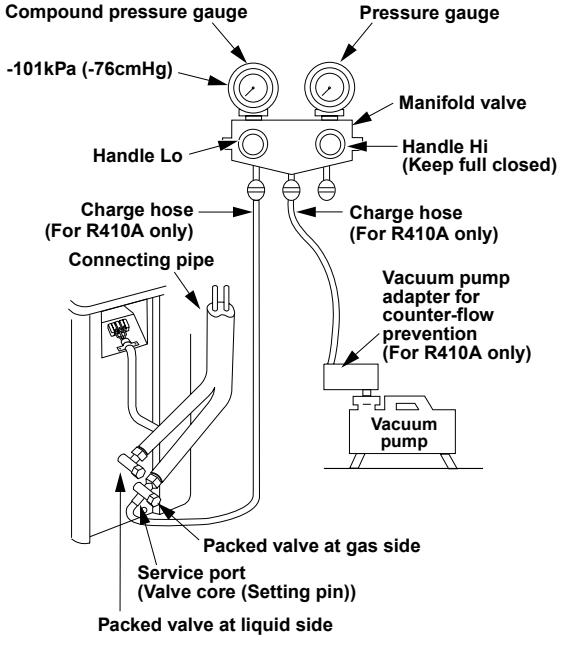


Fig. 8-5-7

<Packed valve handling precautions>

- Open the valve stem all the way out; but do not try to open it beyond the stopper.
- Securely tighten the valve stem cap with torque in the following table:

Gas side (∅12.70 mm)	50 to 62 N·m (5.0 to 6.2 kgf·m)
Liquid side (∅6.35 mm)	16 to 18 N·m (1.6 to 1.8 kgf·m)
Service port	9 to 10 N·m (0.9 to 1.0 kgf·m)

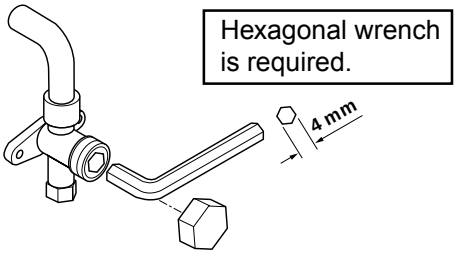


Fig. 8-5-8

8-5-4. Wiring connection

1. Remove the valve cover from the outdoor unit.
2. Connect the connecting cable to the terminal as identified with their respective matched numbers on the terminal block of indoor and outdoor unit.
3. When connecting the connecting cable to the outdoor unit terminal, make a loop as shown in the installation diagram of indoor and outdoor unit, to prevent water coming in the outdoor unit.
4. Insulate the unused cords (conductors) from any water coming in the outdoor unit. Proceed them so that they do not touch any electrical or metal parts.

<Stripping length of connecting cable>

For RAS-13GAH-ES2, RAS-13N2AH-AS2

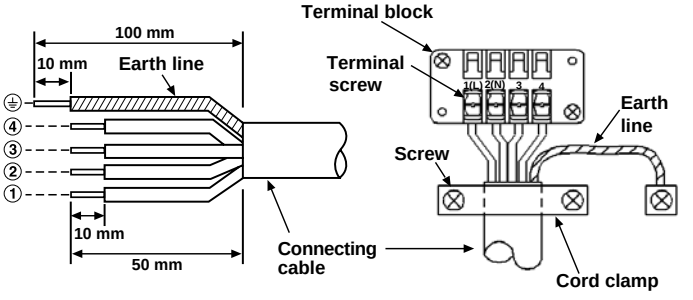


Fig. 8-5-9

For RAS-13GA-ES2, RA-S13N2A-AS2

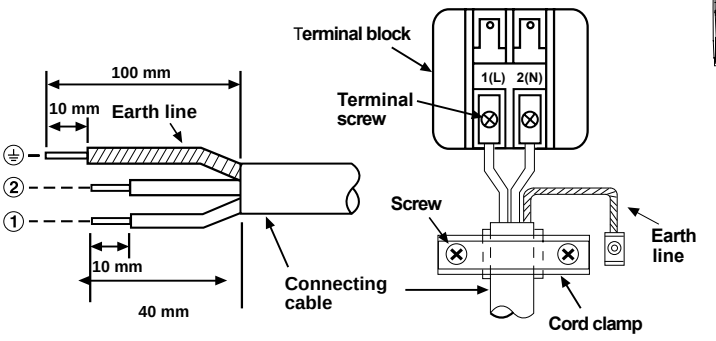


Fig. 8-5-10

CAUTION

- Wrong wiring connection may cause some electrical parts burn out.
- Be sure to comply with local codes on running the wire from indoor unit to outdoor unit (size of wire and wiring method etc.)
- Every wire must be connected firmly.

NOTE

- Wire type: H07 RN-F or 245 IEC66 (2.0 mm^2 or more)

8-6. How to Set Remote Control Selector Switch

When two indoor units ae installed in seperated rooms, there is no need to change the selector switch.

<Remote control selector switch>

- When two indoor units are installed in the same room or the adjacent two rooms, they may be controlled simultaneously with a single remote control. To prevent this, set either unit and its remote control to B setting. (Both units are set to A setting before shipment.)
- The remote control signal is not recived when the indoor unit setting is different from the remote control one.

1. Set the remote control selector switch with the indoor unit.

1) Turn the circuit breaker of the main power switch off before setting the selector switch.
2) Remove the Air inlet grille and Front panel. (Refer to page 59, 10-1)
3) Select the terminal of selector switch from [A position] to [B position].

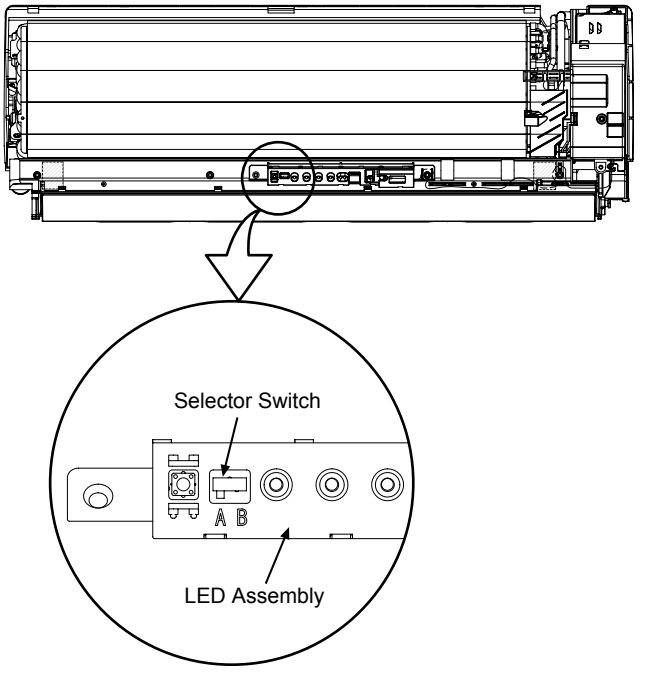


Fig. 8-6-1

2. Set the remote control selector switch with the remote control

[B] is indicated on the liquid crystal display when setting remote control selector switch to B. [A] is not indicated on the display even if the selector switch is set to A.

1) Load the remote control with the batteries.
2) Press the [CHECK] button using something with sharp point. (The preset temperature on the remote control changes to [00].)
3) Press the [MODE] button while pressing the [CHECK] button, [B] is indicted at the right of the present temperature display.

- To reset the switch to the [A] setting, press the [MODE] button again while pressing the [CHECK] button.

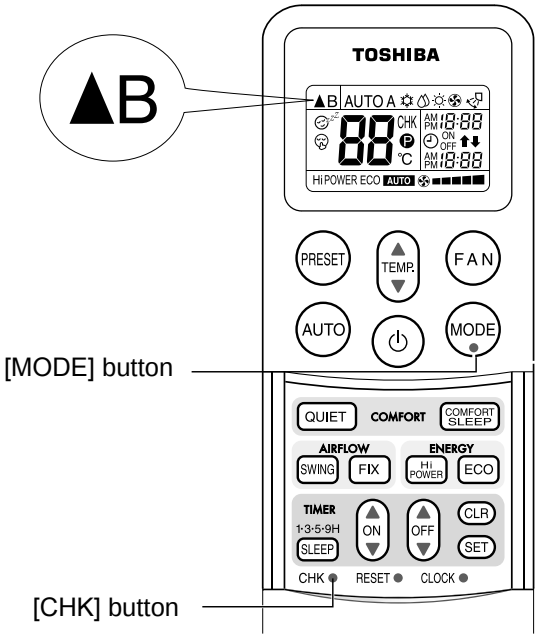


Fig. 8-6-2

3. Confirm that the indoor unit can operate with the new setting.

8-7. Others

8-7-1. Gas leak test

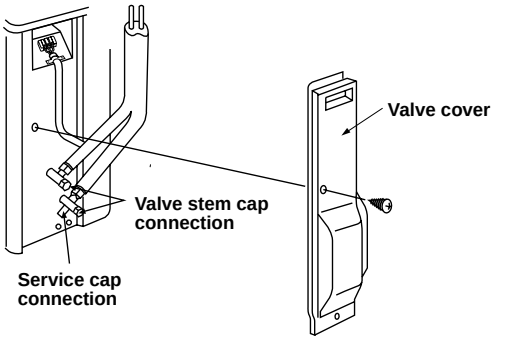
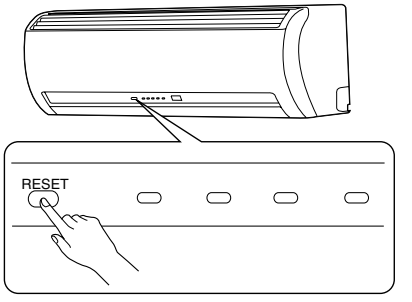


Fig. 8-7-1

- Check the flare nut connections, valve stem cap connections and service port cap connections for gas leak with a leak detector or soap water.

8-7-2. Test operation

To switch the TEST RUN (COOL) mode, press RESET button for 10 sec.
(The beeper will make a short beep.)



RESET button

Fig. 8-7-2

8-7-3. Auto restart setting

This product is designed so that, after a power failure, it can restart automatically in the same operating mode as before the power failure.

Information

The product was shipped with Auto Restart function in the off position. Turn it on as required.

<How to set the auto restart>

- Press and hold the RESET button for about 3 seconds. After 3 seconds, the electronic beeper makes three short beeps to tell you the Auto Restart has been selected.
- To cancel the Auto Restart, follow the steps described in the section Auto Restart Function of the Owner's Manual.

9. TROUBLESHOOTING CHART

9-1. Troubleshooting Procedure

Follow the details of **9-2. Basic Check Items.**
If there is no trouble corresponding to 9-2, check whether or not there are faulty parts following 9-4. Self-Diagnosis by Remote Control.

9-2. Basic Check Items

9-2-1. Power supply voltage

The line voltage must be AC 220 – 240V. If it is not within this range, the air conditioner may not operate normally.

9-2-2. Incorrect cable connection between Indoor and outdoor units

The indoor unit is connected to the outdoor unit with 5 cables (Heat pump model) or 3 cables (Cooling Only model). Check that the indoor and outdoor units have been properly connected with terminals assigned the same numbers. If the connectors are not properly connected, the outdoor unit will not operate normally, or OPERATION lamp and TIMER lamp will blink (5Hz).

9-2-3. Program control

The microcontroller operates as shown in Table 9-2-1 to control the air conditioner. If there are any operational problems, check whether or not the problems correspond to Table 9-2-1. If they correspond to the Table, they are not problems with the air conditioner, but they are indispensable operations to control and maintain the air conditioner properly.

Table 9-2-1

No.	Operation of air conditioner	Descriptions
1	When the main power supply is turned on, the OPERATION lamp on the indoor unit blinks.	The OPERATION lamp blinks to indicate that power is turned on. If the [⏻] button is pressed, the lamp stops blinking.
2	The indoor fan motor speed does not change in the Dry operation.	The indoor fan motor speed is automatically controlled in the Dry operation.
3	The compressor is not turned off even though the room temperature is in the range that the compressor is turned off.	The compressor has a function that it is not turned off for 3 minutes after it is turned on even though the room temperature is in the range that the compressor is turned off.
4	The compressor is not turned on and off even though the thermo control is operated in the Dry operation.	In the Dry operation, the compressor is turned on and off automatically at the regular intervals, independent of the thermo control.
5	The PRE-DEF. lamp is indicated when the Heating operation starts.	The PRE-DEF. lamp is indicated during the Defrosting operation or if the indoor heat exchanger temperature is low when the Heating operation starts. At this time, the indoor fan motor stops to prevent cold air from blowing in the room.
6	The outdoor fan motor stops in the Heating operation.	When the indoor heat exchanger temperature is high, the outdoor fan motor is stopped by the high-temperature limit control operation.
7	The compressor is not turned on even though the room temperature is in the range that the compressor is turned on.	The compressor is not turned on in the restart delay timer (3-minutes timer) operation. It is also not turned on after the power supply is turned on because of this timer operation.
8	The operation mode changes in the Automatic operation.	In Automatic operation, the room temperature is detected all time for control fan speed and the operation mode is changed every 15 minutes according to difference between the room temperature and the preset temperature.
9	The Fan only operation continues in the Automatic operation.	When the room temperature is in the range (Preset temperature ± 1°C), the Fan only operation is selected.
10	The Hi-POWER operation does not work.	This operation does not work when the unit is in the Dry operation or Fan only operation.

9-3. Primary Judgement

9-3-1. Role of indoor unit controller

The indoor unit controller receives the operation commands from the remote control and executes them.

- Temperature measurement at the air outlet of the indoor heat exchanger by the indoor temperature sensor
- Temperature setting of the indoor heat exchanger by the heat exchanger sensor
- Louver motor control
- Indoor fan motor operation control
- LED display control
- Transferring of operation commands to the outdoor unit

9-3-2. Failure diagnosis

The indoor unit diagnoses the operation condition and indicates the information of the self-diagnosis with the lamps on the display panel of the indoor unit.

Table 9-3-1

	Lamps	Self-diagnosis
A	OPERATION lamp is blinking. (1Hz)	Power failure (when the power supply is turning on)
B	OPERATION lamp is blinking. (5Hz)	Thermo sensor (TA) short or break
C	OPERATION lamp is blinking. (5Hz)	Heat exchanger sensor (TC) short or break
D	OPERATION lamp is blinking. (5Hz)	Indoor fan motor lock or failure
E	OPERATION lamp is blinking. (5Hz)	Indoor P.C. board failure
F	OPERATION and TIMER lamps are blinking. (5Hz)	Wrong wiring of connecting cable
G	OPERATION, TIMER and PRE-DEF. (or FAN ONLY for cooling only model) lamps are blinking.	Cycle failure • Gas shortage or other refrigerant cycle trouble • Heat exchanger sensor open, break or short • Overload relay or thermostat trouble of compressor

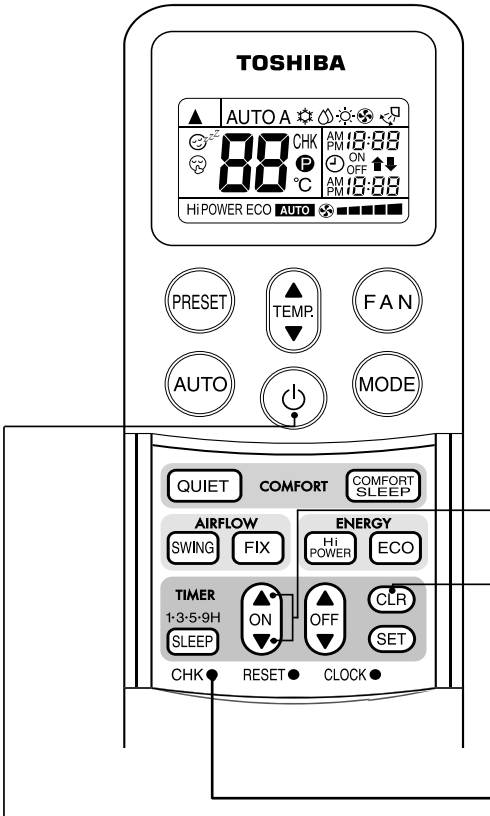
Table 9-3-2 Diagnosis by detective operation

Symptom	Check		Primary judgement
The remote control does not work.	Turn off the power supply once, then turn it on. Try to operate the remote control.	The remote control still does not work.	The indoor unit (and/or remote control) is/are defective.
		The remote control works.	OK.
The outdoor fan does not rotate.	The compressor operates.		The outdoor unit (Outdoor fan motor) is defective.
	The compressor does not operate.		An internal part of the compressor or PCB is defective.

9-4. Self-Diagnosis by Remote Control (Check Code)

(1) If the lamps are indicated as shown B to G in Table 9-3-1, exchanger the self-diagnosis by the remote control.
(2) When the remote control is set to the service mode, the indoor controller diagnoses the operation condition and indicate the information of the self-diagnosis on the display of the remote control with the check codes. If a fault is detected, all lamps on the indoor unit will blink at 5Hz and it will beep for 10 seconds (Pi, Pi, Pi....). The timer lamp usually blinks (5Hz) during the self-diagnosis.

9-4-1. How to use remote control in service mode



(1) Press [CHK] button with a tip of pencil to set the remote control to the service mode.
- "00" is indicated on the display of the remote control.
- The timer lamp on the indoor unit blinks continuously. (5 times per 1 sec.)

(2) Press [TIMER ▲] button.
If there is no fault with a code, the indoor unit will beep once (Pi) and the display of the remote control will change as follows:

→ 00 → 01 → 02 ··· 1d → 1E → 22 →

- Check the unit with all 35 check codes (00 to 22). as shown in Table 9-4-1.
- Press [TIMER ▼] button to change the check code backwards.

If there is a fault, the indoor unit will beep for 10 seconds (Pi, Pi, Pi...).
Note the check code on the display of the remote control.
- 2-digits alphanumeric will be indicated on the display.
- All lamps on the indoor unit will blink. (5 times per 1 sec.)

(3) Press [CLR] button. After service finish for clear service code in memory.
- "7F" is indicated on the display of the remote control.

(4) Press [⏻] button to release the service mode.
- The display of the remote control returns to as it was before service mode was engaged.

- Alphanumeric characters are used for the check code.

5	is 5.	6	is 6.
A	is A.	b	is B.
C	is C.	d	is D.

* This illustration in only for Heat pump model.
For Cooling only model, there is not the (☼) symbol.

Table 9-4-1

Block level		Diagnosis function				Judgement and action
Check code	Block	Check code	Symptom	Air Conditioner status	Condition	
00	Indoor P.C. board	0C	Thermo. sensor short/break.	Continued operation.	Indicated when detected abnormal	1. Check thermo sensor. 2. If it is OK, check P.C. board.
		0d	Heat exchanger sensor short/break.	Continued operation.	Indicated when detected abnormal	1. Check heat exchanger sensor. 2. If it is OK, check P.C. board.
		11	Indoor fan lock, abnormality of indoor fan or thermal fuse break.	All off	Indicated when detected abnormal	1. Check heat thermal fuse is blow or not? (Terminal block part.) 2. If the thermal fuse is not blow, check indoor fan motor. (Refer to trouble shooting flow charts.)
		12	Abnormality of other indoor unit P.C. board.	All off	Indicated when detected abnormal	Replace P.C. borad.
01	Cable connection/ Thermal fuse Refrigerant system	04	1) Wrong wiring or disconnection of connective cable. 2) Terminal fuse cut off.	All off	Indicated when detected abnormal	1. Check connective cable correct if wiring is wrong. 2. Check thermal fuse and Terminal blocks. 3. If it is OK, check P.C. board.
03	Other parts (including compressor)	09	1) Overload relay or thermostat for compressor break.	All off	Indicated when detected abnormal	1. If overload relay and themostat for compressor are OK, check refrigerant cycle. 2. If refrigerant cycle is OK, check P.C. board. 3. If heat exchanger sensor is OK, check overload relay and themostat for compressor.
Content detected by the check codes "04" to "Id" are stored in memory of the microcomputer even if the power supply is turned off. Therefore, contents of operations in the past are all displayed.						

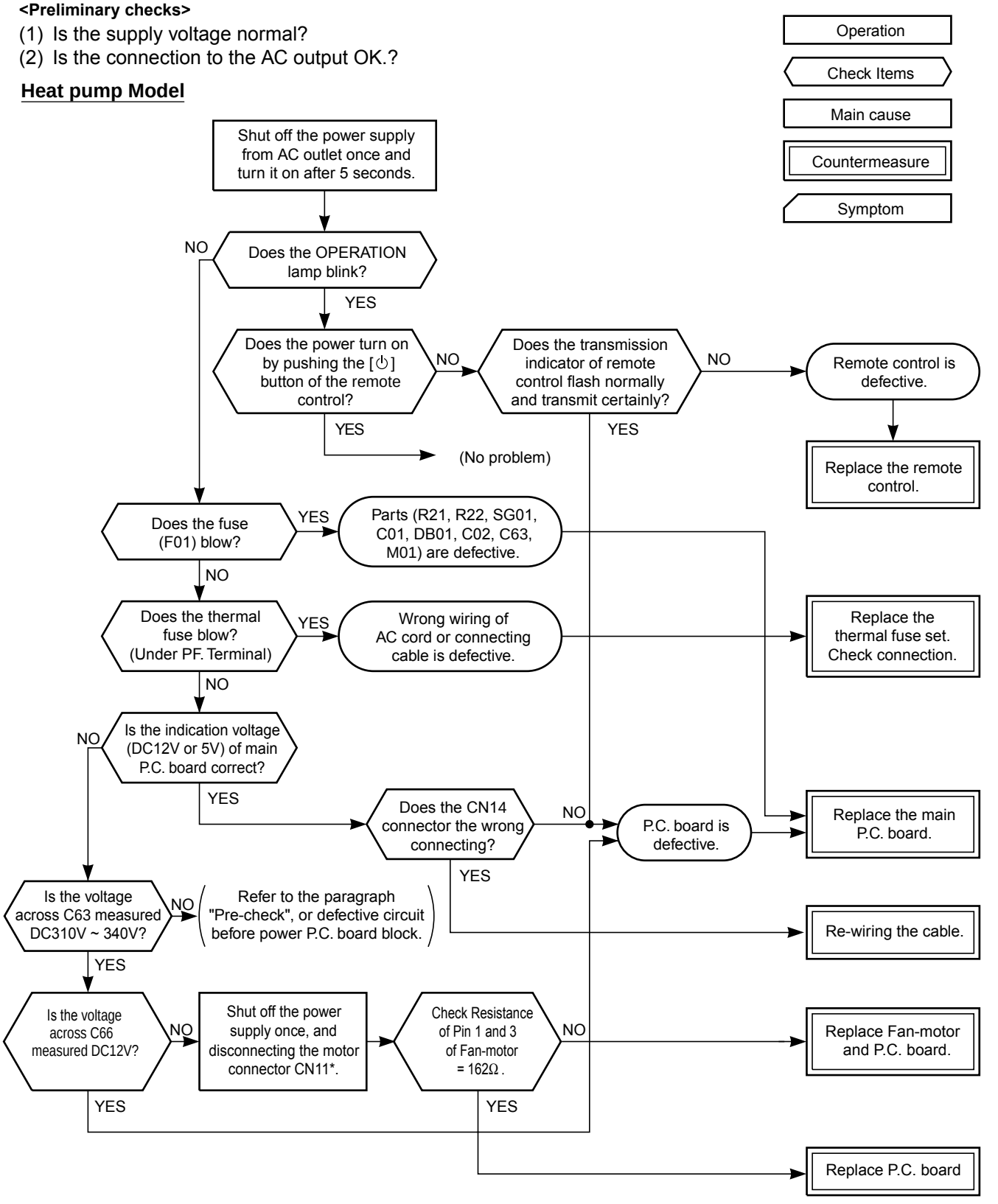
9-5. Troubleshooting Flowcharts

9-5-1. Power can not be turned on (No operation at all)

<Preliminary checks>

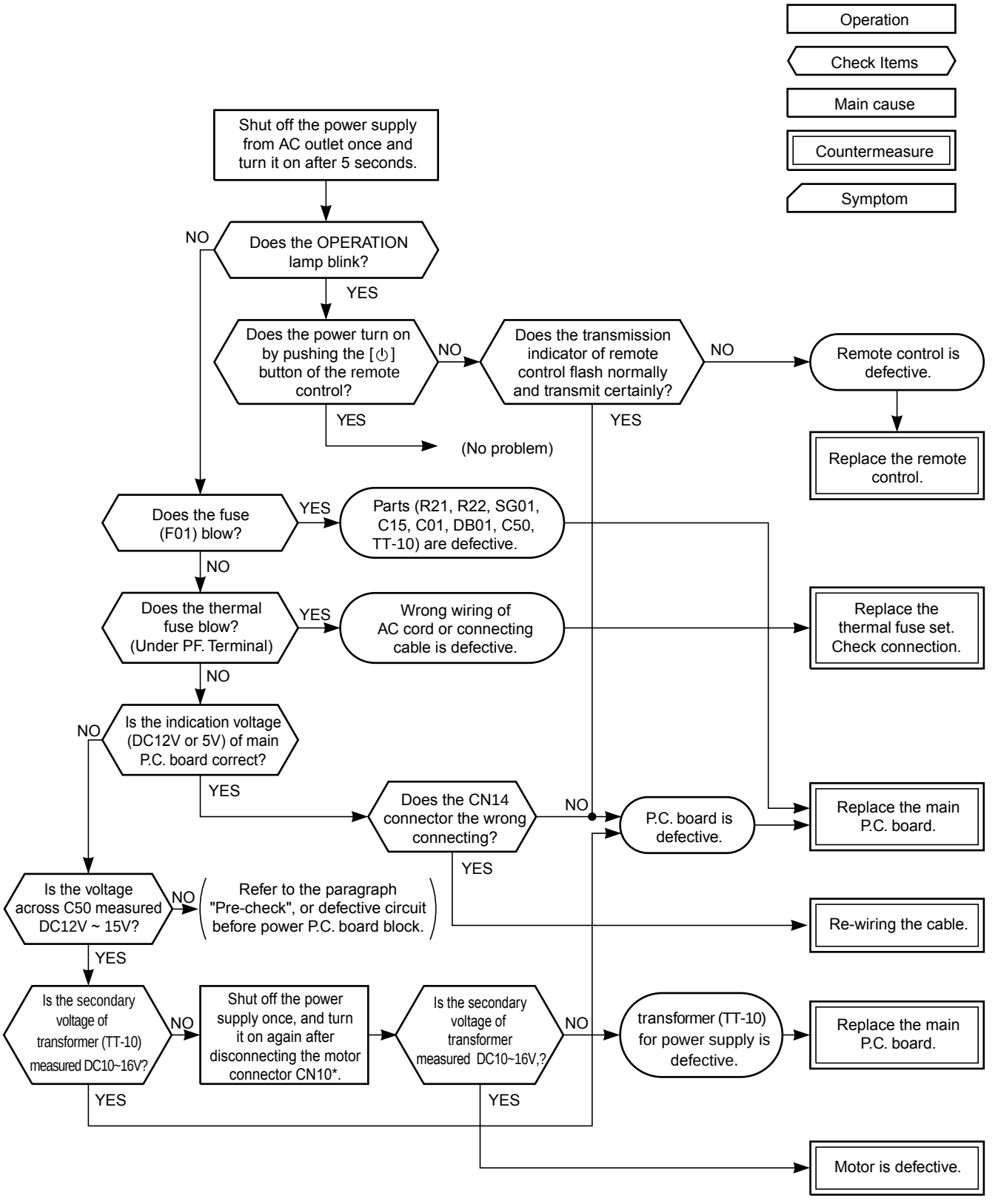
(1) Is the supply voltage normal?
(2) Is the connection to the AC output OK.?

Heat pump Model


Operation
Check Items
Main cause
Countermeasure
Symptom
Shut off the power supply from AC outlet once and turn it on after 5 seconds.
Does the OPERATION lamp blink?
NO
YES
Does the power turn on by pushing the [⏻] button of the remote control?
NO
Does the transmission indicator of remote control flash normally and transmit certainly?
NO
Remote control is defective.
Replace the remote control.
YES
YES
(No problem)
Does the fuse (F01) blow?
YES
Parts (R21, R22, SG01, C01, DB01, C02, C63, M01) are defective.
NO
Does the thermal fuse blow? (Under PF. Terminal)
YES
Wrong wiring of AC cord or connecting cable is defective.
Replace the thermal fuse set. Check connection.
NO
Is the indication voltage (DC12V or 5V) of main P.C. board correct?
NO
YES
Does the CN14 connector the wrong connecting?
NO
P.C. board is defective.
Replace the main P.C. board.
YES
Is the voltage across C63 measured DC310V ~ 340V?
NO
Refer to the paragraph "Pre-check", or defective circuit before power P.C. board block.
Re-wiring the cable.
YES
Is the voltage across C66 measured DC12V?
NO
Shut off the power supply once, and disconnecting the motor connector CN11*.
Check Resistance of Pin 1 and 3 of Fan-motor = 162Ω .
NO
Replace Fan-motor and P.C. board.
YES
YES
Replace P.C. board

* Be sure to disconnect the motor connector CN10 after shut off the power supply, or it will be a cause of damage of the motor.

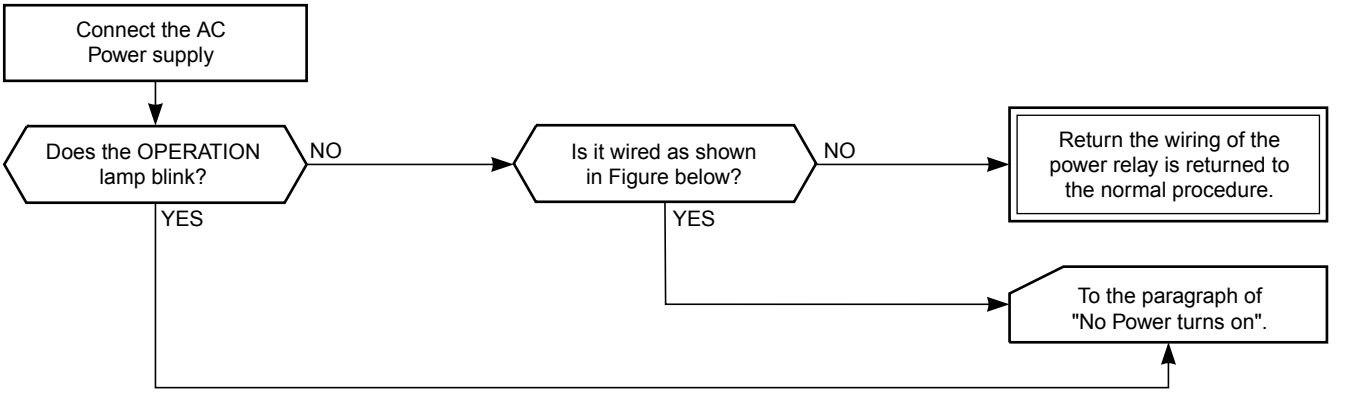
Cooling Model


Operation
Check Items
Main cause
Countermeasure
Symptom
Shut off the power supply from AC outlet once and turn it on after 5 seconds.
Does the OPERATION lamp blink?
NO
YES
Does the power turn on by pushing the [⏻] button of the remote control?
NO
YES
(No problem)
Does the transmission indicator of remote control flash normally and transmit certainly?
NO
YES
Remote control is defective.
Replace the remote control.
Does the fuse (F01) blow?
YES
Parts (R21, R22, SG01, C15, C01, DB01, C50, TT-10) are defective.
NO
Does the thermal fuse blow? (Under PF. Terminal)
YES
Wrong wiring of AC cord or connecting cable is defective.
Replace the thermal fuse set. Check connection.
NO
Is the indication voltage (DC12V or 5V) of main P.C. board correct?
NO
YES
Does the CN14 connector the wrong connecting?
NO
P.C. board is defective.
Replace the main P.C. board.
YES
Is the voltage across C50 measured DC12V ~ 15V?
NO
Refer to the paragraph "Pre-check", or defective circuit before power P.C. board block.
Re-wiring the cable.
YES
Is the secondary voltage of transformer (TT-10) measured DC10~16V?
NO
Shut off the power supply once, and turn it on again after disconnecting the motor connector CN10*.
Is the secondary voltage of transformer measured DC10~16V,?
NO
transformer (TT-10) for power supply is defective.
Replace the main P.C. board.
YES
YES
Motor is defective.

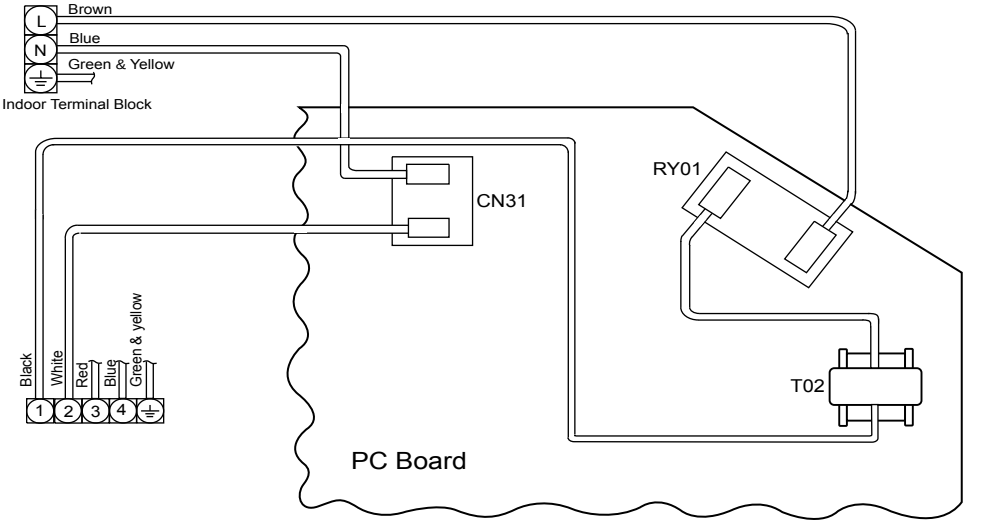
* Be sure to disconnect the motor connector CN10 after shut off the power supply, or it will be a cause of damage of the motor.

9-5-2. Power can not be turned on after replacing indoor P.C. board

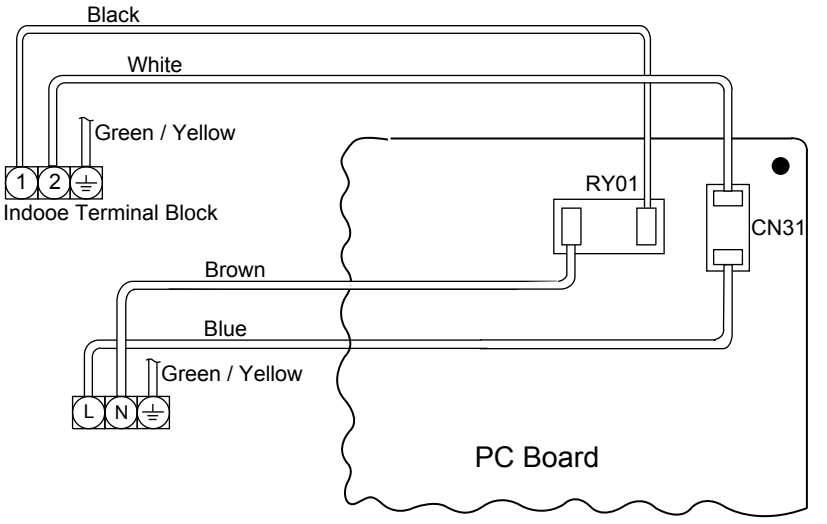
<Checking Procedure>


Connect the AC Power supply
Does the OPERATION lamp blink?
NO
YES
Is it wired as shown in Figure below?
NO
YES
Return the wiring of the power relay is returned to the normal procedure.
To the paragraph of "No Power turns on".

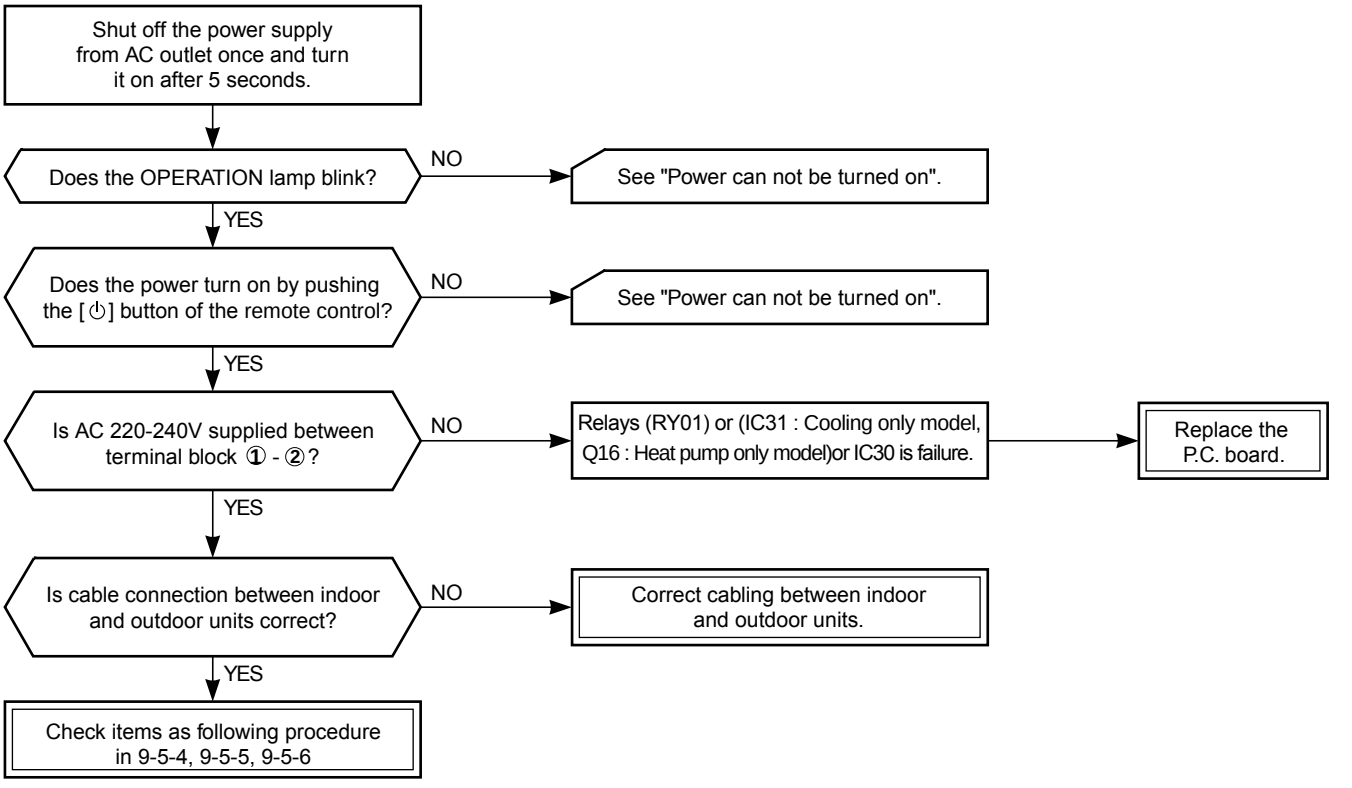
Heat pump Model



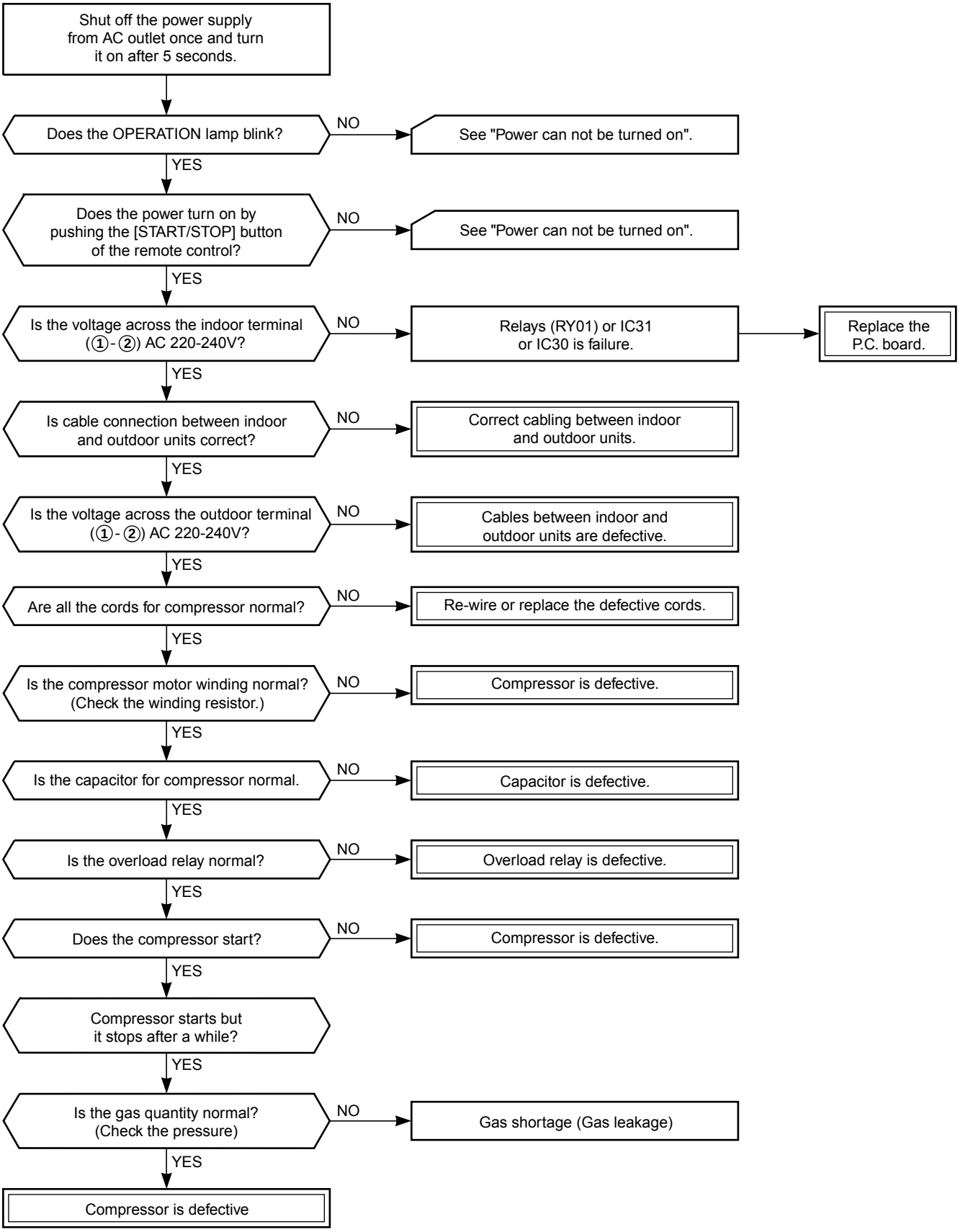
Cooling Model



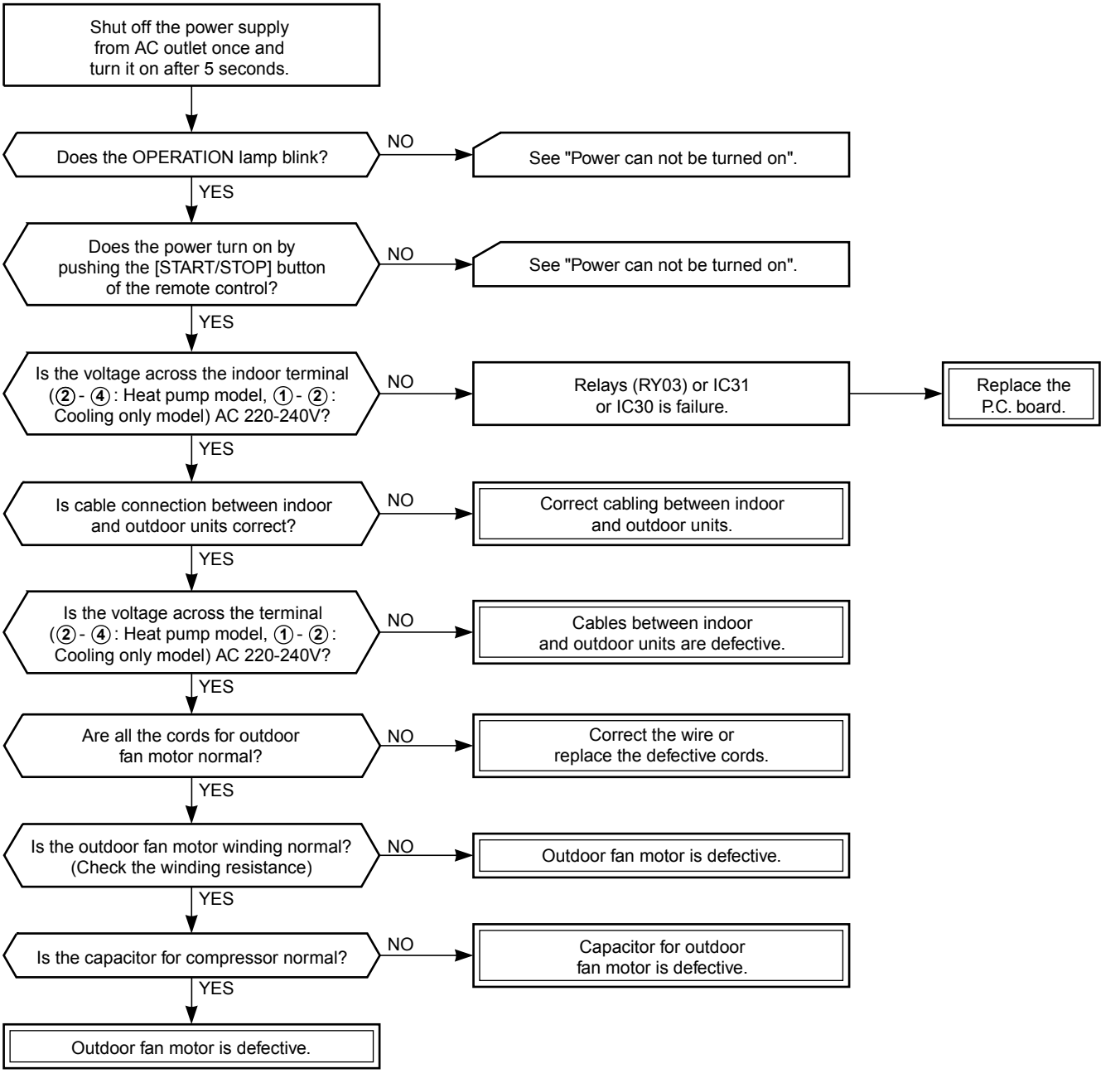
9-5-3. Outdoor unit does not operate


Shut off the power supply from AC outlet once and turn it on after 5 seconds.
Does the OPERATION lamp blink?
NO
See "Power can not be turned on".
YES
Does the power turn on by pushing the [⏻] button of the remote control?
NO
See "Power can not be turned on".
YES
Is AC 220-240V supplied between terminal block ① - ②?
NO
Relays (RY01) or (IC31 : Cooling only model, Q16 : Heat pump only model)or IC30 is failure.
Replace the P.C. board.
YES
Is cable connection between indoor and outdoor units correct?
NO
Correct cabling between indoor and outdoor units.
YES
Check items as following procedure in 9-5-4, 9-5-5, 9-5-6

9-5-4. Only compressor does not operate

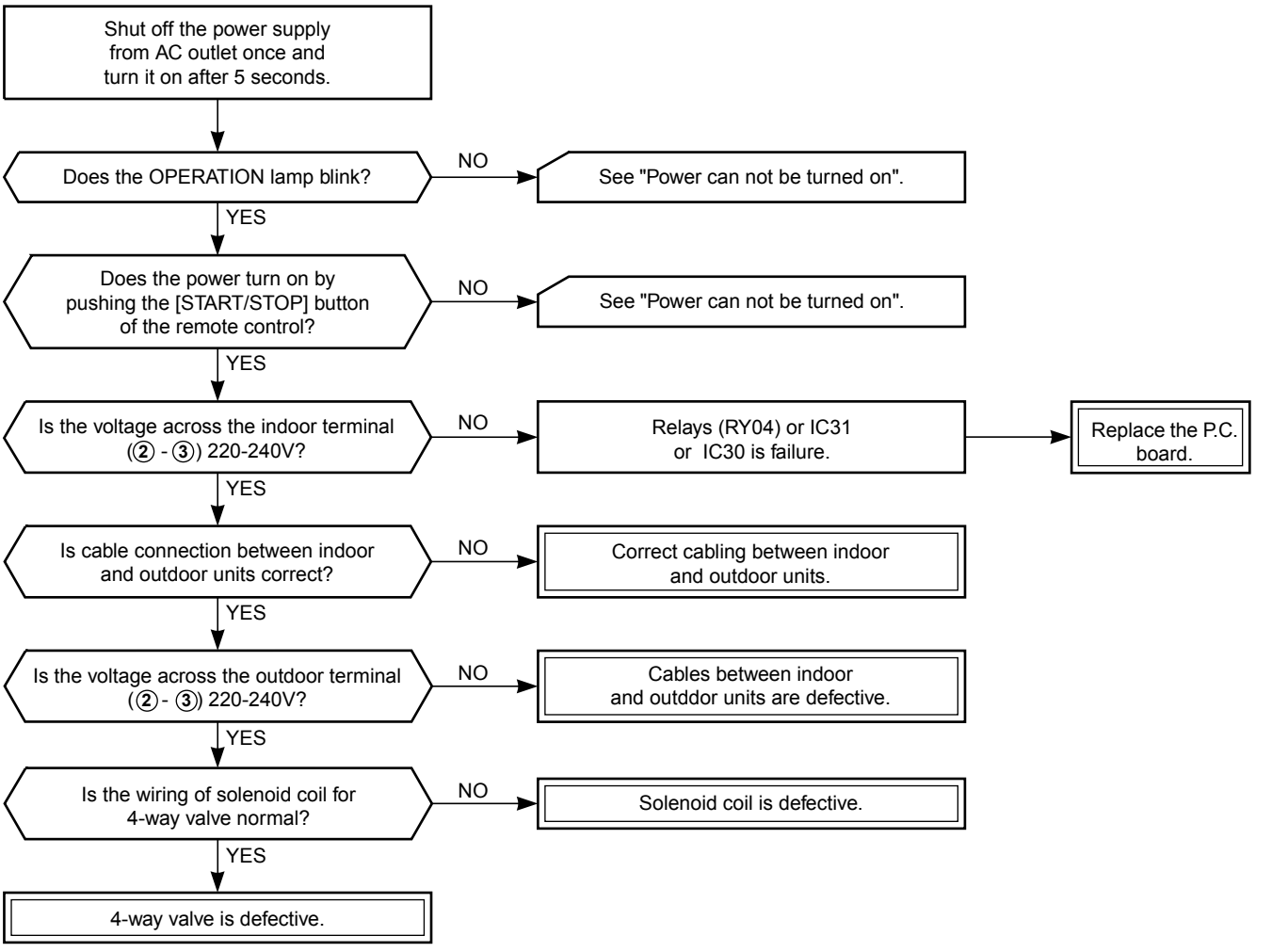

Shut off the power supply from AC outlet once and turn it on after 5 seconds.
Does the OPERATION lamp blink?
NO
See "Power can not be turned on".
YES
Does the power turn on by pushing the [START/STOP] button of the remote control?
NO
See "Power can not be turned on".
YES
Is the voltage across the indoor terminal (①-②) AC 220-240V?
NO
Relays (RY01) or IC31 or IC30 is failure.
Replace the P.C. board.
YES
Is cable connection between indoor and outdoor units correct?
NO
Correct cabling between indoor and outdoor units.
YES
Is the voltage across the outdoor terminal (①-②) AC 220-240V?
NO
Cables between indoor and outdoor units are defective.
YES
Are all the cords for compressor normal?
NO
Re-wire or replace the defective cords.
YES
Is the compressor motor winding normal? (Check the winding resistor.)
NO
Compressor is defective.
YES
Is the capacitor for compressor normal.
NO
Capacitor is defective.
YES
Is the overload relay normal?
NO
Overload relay is defective.
YES
Does the compressor start?
NO
Compressor is defective.
YES
Compressor starts but it stops after a while?
YES
Is the gas quantity normal? (Check the pressure)
NO
Gas shortage (Gas leakage)
YES
Compressor is defective

9-5-5. Only outdoor fan does not operate


Shut off the power supply from AC outlet once and turn it on after 5 seconds.
Does the OPERATION lamp blink?
NO
See "Power can not be turned on".
YES
Does the power turn on by pushing the [START/STOP] button of the remote control?
NO
See "Power can not be turned on".
YES
Is the voltage across the indoor terminal (②-④: Heat pump model, ①-②: Cooling only model) AC 220-240V?
NO
Relays (RY03) or IC31 or IC30 is failure.
Replace the P.C. board.
YES
Is cable connection between indoor and outdoor units correct?
NO
Correct cabling between indoor and outdoor units.
YES
Is the voltage across the terminal (②-④: Heat pump model, ①-②: Cooling only model) AC 220-240V?
NO
Cables between indoor and outdoor units are defective.
YES
Are all the cords for outdoor fan motor normal?
NO
Correct the wire or replace the defective cords.
YES
Is the outdoor fan motor winding normal? (Check the winding resistance)
NO
Outdoor fan motor is defective.
YES
Is the capacitor for compressor normal?
NO
Capacitor for outdoor fan motor is defective.
YES
Outdoor fan motor is defective.

9-5-6. Only 4-Way valve does not operate (During heating operation)

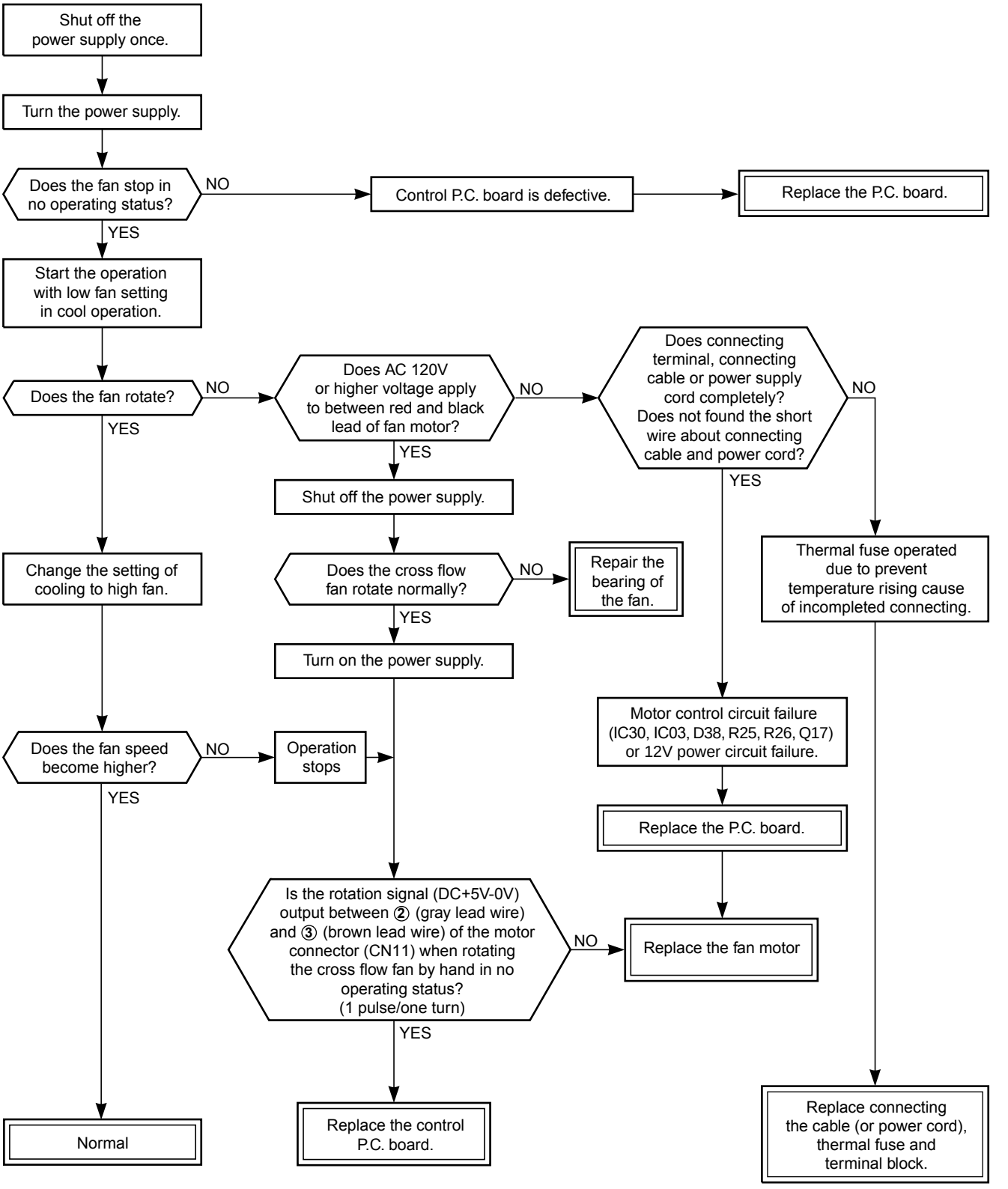
Heat Pump Model


Shut off the power supply from AC outlet once and turn it on after 5 seconds.
Does the OPERATION lamp blink?
NO
See "Power can not be turned on".
YES
Does the power turn on by pushing the [START/STOP] button of the remote control?
NO
See "Power can not be turned on".
YES
Is the voltage across the indoor terminal (② - ③) 220-240V?
NO
Relays (RY04) or IC31 or IC30 is failure.
Replace the P.C. board.
YES
Is cable connection between indoor and outdoor units correct?
NO
Correct cabling between indoor and outdoor units.
YES
Is the voltage across the outdoor terminal (② - ③) 220-240V?
NO
Cables between indoor and outddor units are defective.
YES
Is the wiring of solenoid coil for 4-way valve normal?
NO
Solenoid coil is defective.
YES
4-way valve is defective.

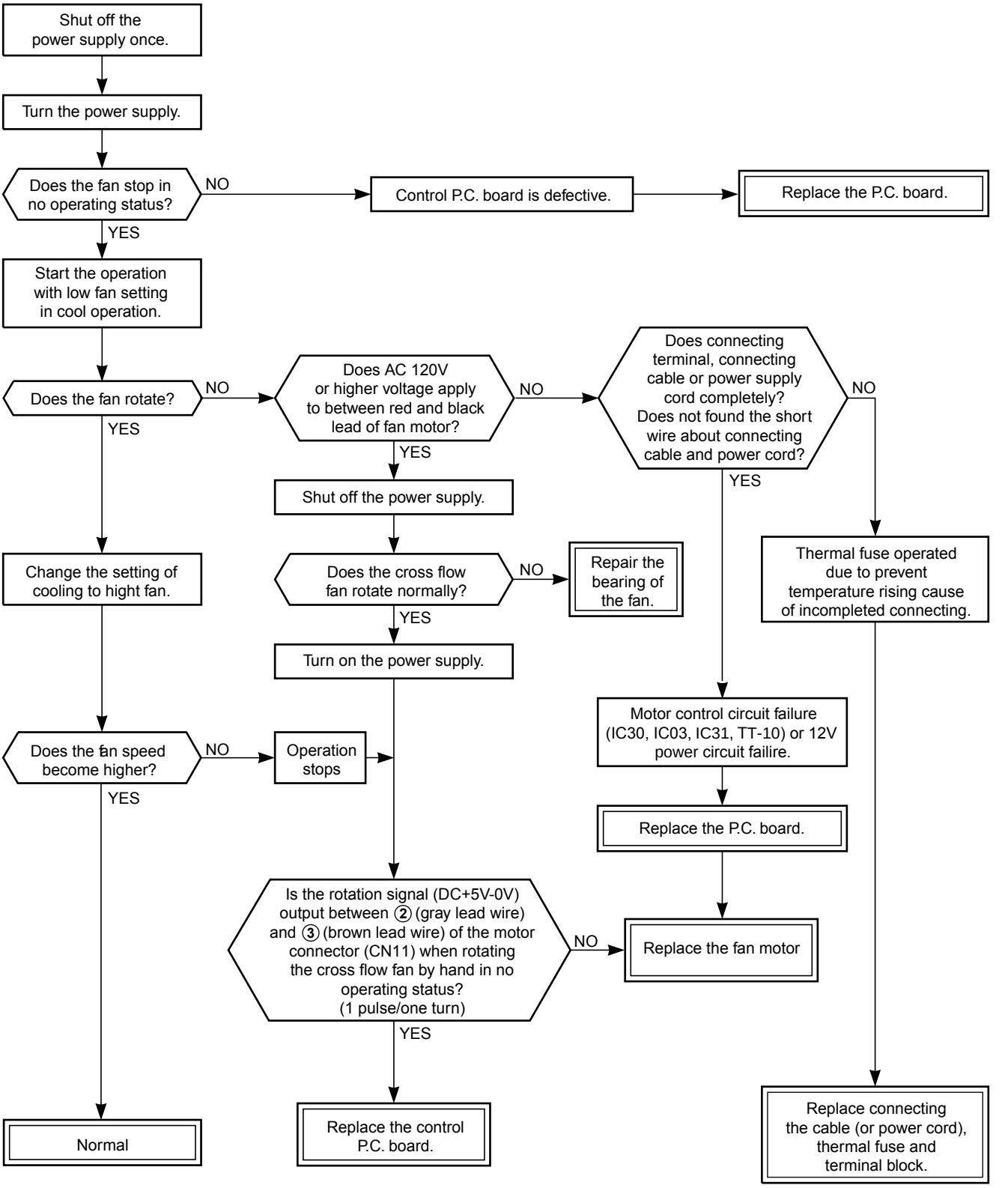
9-5-7. Only the indoor fan does not operate

<Check procedure>

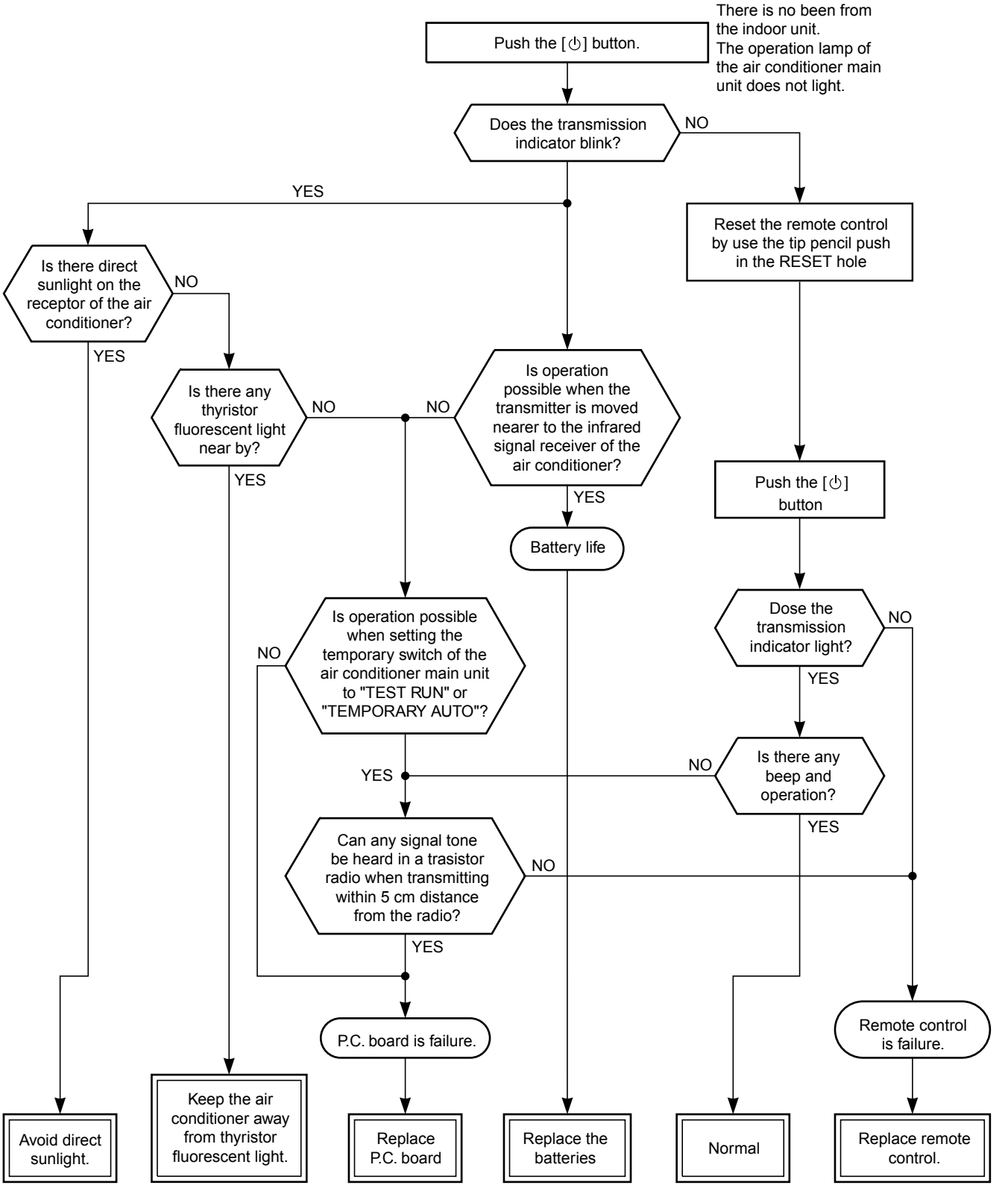
Heat Pump Model


Shut off the power supply once.
Turn the power supply.
Does the fan stop in no operating status?
NO
Control P.C. board is defective.
Replace the P.C. board.
YES
Start the operation with low fan setting in cool operation.
Does the fan rotate?
NO
Does AC 120V or higher voltage apply to between red and black lead of fan motor?
NO
Does connecting terminal, connecting cable or power supply cord completely? Does not found the short wire about connecting cable and power cord?
NO
YES
YES
YES
Shut off the power supply.
Change the setting of cooling to high fan.
Does the cross flow fan rotate normally?
NO
Repair the bearing of the fan.
Thermal fuse operated due to prevent temperature rising cause of incompleted connecting.
YES
Turn on the power supply.
Motor control circuit failure (IC30, IC03, D38, R25, R26, Q17) or 12V power circuit failure.
Does the fan speed become higher?
NO
Operation stops
YES
Replace the P.C. board.
Is the rotation signal (DC+5V-0V) output between ② (gray lead wire) and ③ (brown lead wire) of the motor connector (CN11) when rotating the cross flow fan by hand in no operating status? (1 pulse/one turn)
NO
Replace the fan motor
YES
Normal
Replace the control P.C. board.
Replace connecting the cable (or power cord), thermal fuse and terminal block.

Cooling Model


Shut off the power supply once.
Turn the power supply.
Does the fan stop in no operating status?
NO
Control P.C. board is defective.
Replace the P.C. board.
YES
Start the operation with low fan setting in cool operation.
Does the fan rotate?
NO
Does AC 120V or higher voltage apply to between red and black lead of fan motor?
NO
Does connecting terminal, connecting cable or power supply cord completely? Does not found the short wire about connecting cable and power cord?
NO
YES
YES
YES
Shut off the power supply.
Change the setting of cooling to hight fan.
Does the cross flow fan rotate normally?
NO
Repair the bearing of the fan.
Thermal fuse operated due to prevent temperature rising cause of incompleted connecting.
YES
Turn on the power supply.
Motor control circuit failure (IC30, IC03, IC31, TT-10) or 12V power circuit failire.
Does the fan speed become higher?
NO
Operation stops
YES
Replace the P.C. board.
Is the rotation signal (DC+5V-0V) output between ② (gray lead wire) and ③ (brown lead wire) of the motor connector (CN11) when rotating the cross flow fan by hand in no operating status? (1 pulse/one turn)
NO
Replace the fan motor
YES
Normal
Replace the control P.C. board.
Replace connecting the cable (or power cord), thermal fuse and terminal block.

9-6. Troubleshooting for Remote Control (Including the Indoor P.C. Board)


There is no been from the indoor unit. The operation lamp of the air conditioner main unit does not light.
Push the [⏻] button.
Does the transmission indicator blink?
NO
YES
Reset the remote control by use the tip pencil push in the RESET hole
Is there direct sunlight on the receptor of the air conditioner?
NO
YES
Is there any thyristor fluorescent light near by?
NO
YES
NO
Is operation possible when the transmitter is moved nearer to the infrared signal receiver of the air conditioner?
YES
Battery life
Push the [⏻] button
Dose the transmission indicator light?
NO
YES
Is operation possible when setting the temporary switch of the air conditioner main unit to "TEST RUN" or "TEMPORARY AUTO"?
NO
YES
NO
Is there any beep and operation?
YES
Can any signal tone be heard in a trasistor radio when transmitting within 5 cm distance from the radio?
NO
YES
P.C. board is failure.
Remote control is failure.
Avoid direct sunlight.
Keep the air conditioner away from thyristor fluorescent light.
Replace P.C. board
Replace the batteries
Normal
Replace remote control.

9-6-1 How to check the P.C. board

(1) Operating precautions

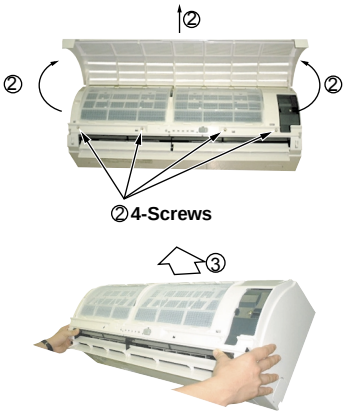
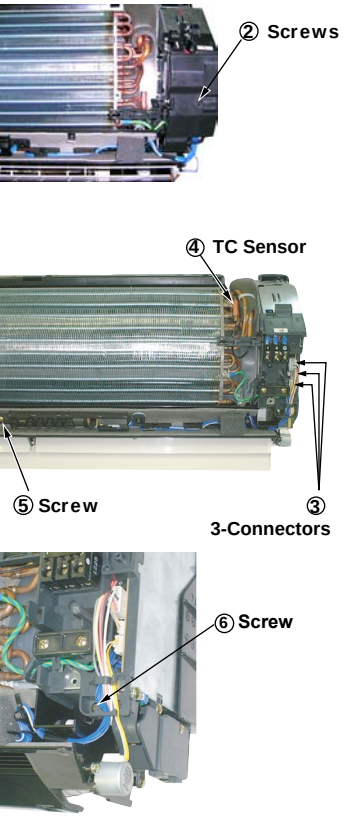
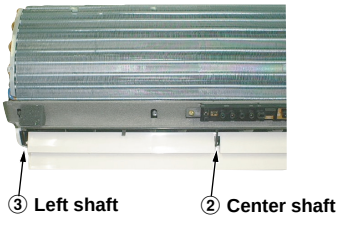
1) When removing the front panel or the P.C. board, be sure to shut off the power supply.
2) When removing the P.C. board, hold the edge of the P.C. board and do not apply force to the parts.
3) When connecting or disconnecting the connectors on the P.C. board, hold the Whole housing. Do not pull at the lead wire.

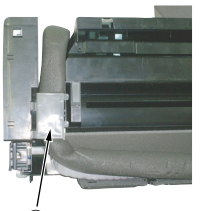
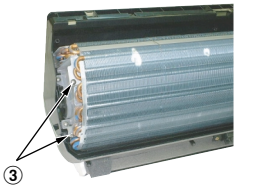
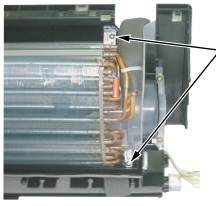
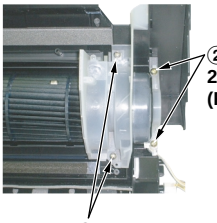
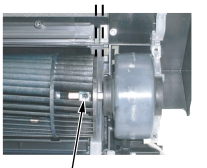
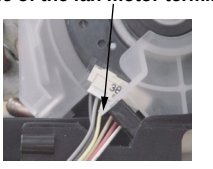
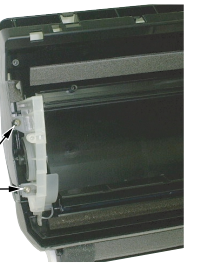
(2) Inspection procedres

1) When a P.C. board is judged to be defective, check for disconnection, burning, or discoloration of the copper foil pattern or this P.C. board.
2) The P.C. board consists of the following 2 parts
   a. Main P.C. board part:
   power relay, indoor fan motor drive circuit and control circuit, C.P.U. and peripheral circuits, buzzer drive circuit and buzzer.
   b. Infrared rays receive and indication parts:
   Infrared rays receiver unit and LED.

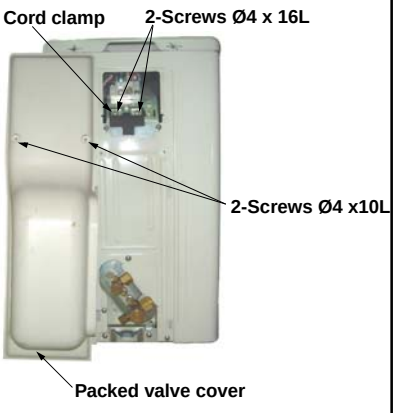
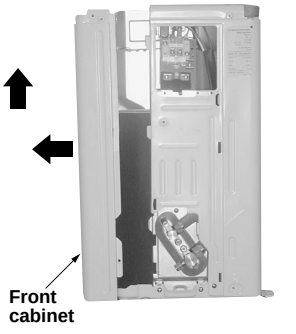
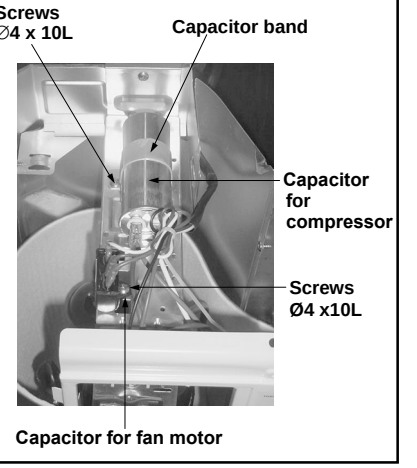
10. PART REPLACEMENT

10-1. Indoor Unit

No.	Part name	Procedures	Remarks
①	Front panel	How to remove the front panel 1) Stop the operation of the air conditioner and turn off its main power supply. 2) Pull the air inlet grille toward you to open it and remove the air inlet grille. Then remove the 4 screws fixing the front panel. 3) First open the horizontal louver, and then remove the front panel from the back body by pulling it toward you. How to mount the front panel Push the front panel back in and make sure all hooks are locked.	
②	Electrical part	How to remove the electrical part. 1) Remove the front panel with procedure ①. 2) Remove the screw holding the electrical part cover. 3) Disconnect the 2 connectors (3P) for the fan motor and the connector (5P) for the louver motor from the P.C. board assembly. 4) Pull out the TC sensor from the sensor holder. 5) Remove the screw for the ground connection, remove the 2 screws for the electrical part box and remove the screw from the LED unit. Then remove the LED unit and the electrical part box from the main unit. How to mount the electrical part. 1) To put back the electrical part box, lock it to the upper hook of the back body. 2) Tighten the screws on the electrical part box. 3) Connect the 3 connectors and arrange the wiring same as original condition and then tighten the screw from the LED unit to the back body. 4) Attach the TC sensor to the holder. 5) Tighten the screw for the ground connection. 6) Assemble the drain guide (the TC sensor wire should be covered by the drain guide). 7) Tighten the screw on the electrical part cover.	
③	Horizontal louver	1) Remove the front panel and the electrical part following procedure ②. 2) Remove the center shaft of the horizontal louver from the back body. 3) Remove the left shaft from the back body. 4) Remove the horizontal louver from the back body.	

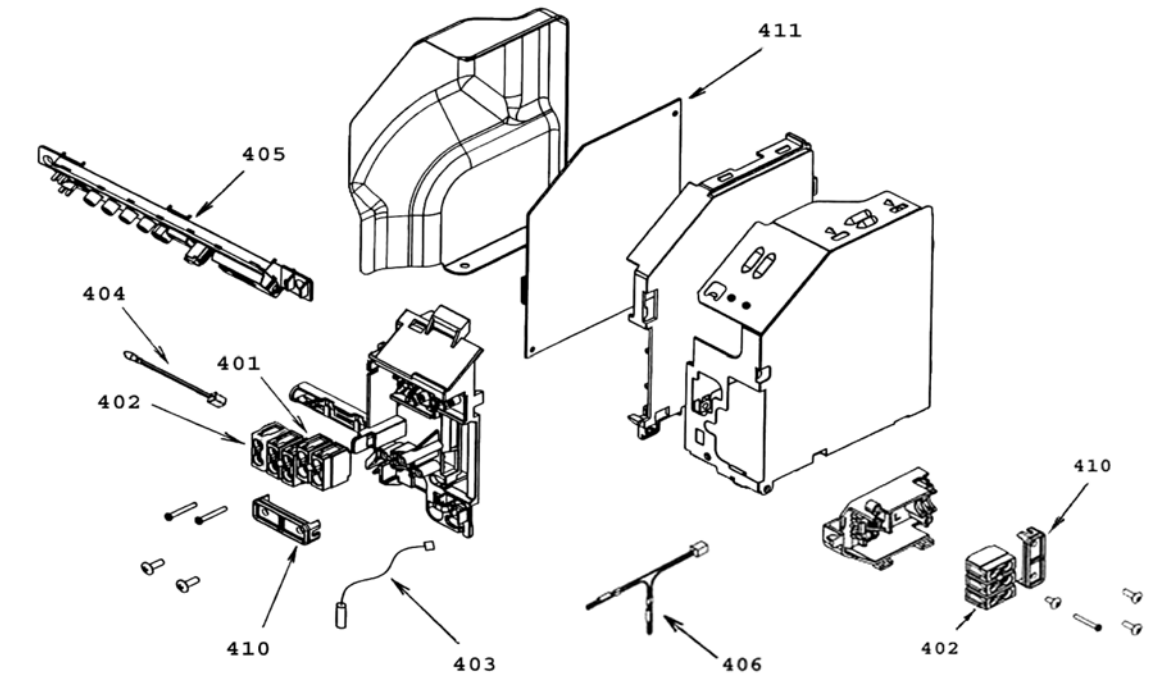
No.	Part name	Procedures	Remarks
④	Heat exchanger	1) Remove the front panel, electrical part and the horizontal louver following procedure ③. 2) Remove the pipe holder at the rear side of main unit. 3) Remove the 2 screws on the heat exchanger at the base bearing. 4) Remove the 2 screws on the heat exchanger at the 2 fixed plates (upper and lower) from the back body, and then pull out the upper side of the heat exchanger slowly.	 ② Pipe holder  ③ 2-Screws  ④ 2-Screws
⑤	Cross flow fan	1) Remove the front panel, electrical part, horizontal louver and the heat exchanger following procedure ④. 2) Remove the 2 screws on the band motor (L) and remove the 2 screws on the band motor (R) and then remove the cross flow fan. 3) Loosen the set screw of the cross flow fan then separate the fan and the fan motor. Notice To assemble cross flow fan and fan motor to the unit, please turn the fan motor unit the center of its terminal meets the lowest point of band motor (R) (point A). Fix the cross flow fan with the set screw at the position where the gap between the back body and the right surface of the cross flow fan is 6 mm.	 ② 2-Screws (R) ② 2-Screws (L) 6 mm  ⑥ Set screw Middle of the fan motor terminal 
⑥	Base bearing	1) Remove the front panel, electrical part, horizontal louver, heat exchanger and the cross flow fan following procedure ⑤. 2) Remove the 2 screws fixing the base bearing. 3) Remove the bearing from the base bearing. If the housing protrudes from the base bearing, put the housing in position and attach the bearing to the base bearing.	 ② 2-Screws

10-2. Outdoor Unit

No.	Part name	Procedures	Remarks
①	Common procedure	1) Stop the operation of air-conditioner, and disconnect the power cord from the AC supply. 2) Remove packed valve cover and Electric parts cover. (2-Screws ∅4 x 10L) 3) Remove the cord clamp (2-Screws ∅4 x 16L) and disconnect the connecting cable. 4) Remove the upper cabinet (5-Screws ∅4 x 10L) Pulling out upword. 5) Remove the front cabinet. (3-Screws ∅4 x 10L) Pull the front right portion toward you, and remove it pulling out upward.	 
②	Capacitor for compressor	1) Perform the common procedure ①. 2) Remove the fixing screw and the capacitor band. (1-Screw ∅4 x 10L) 3) Disconnect the lead wires.	
③	Capacitor for fan motor	1) Perform the common procedure ①. 2) Remove the fixing screw and the capacitor band. (1-Screw ∅4 x 10L) 3) Disconnect the lead wires.	

11. EXPLODED VIEWS AND PARTS LIST

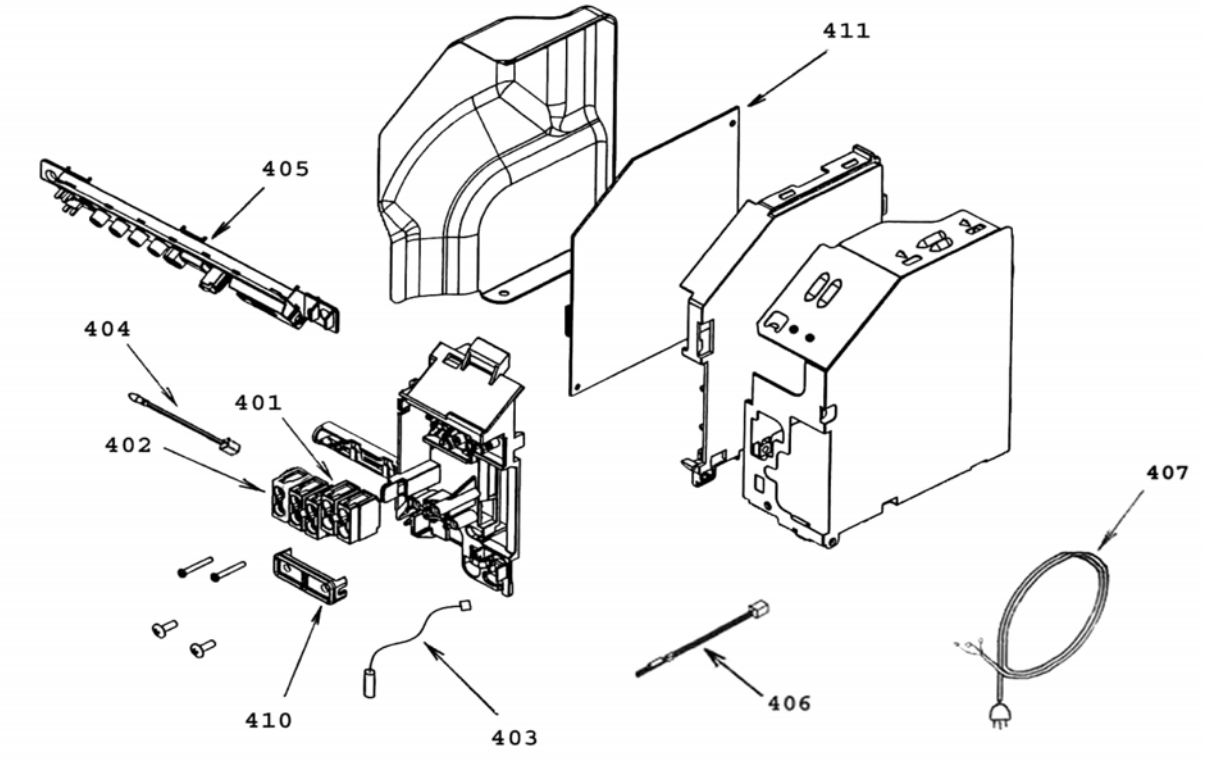
11-1. Indoor Unit (E-Parts Assy) (RAS-13GKHP-ES2)



Location No.	Part No.	Description
401	43T60001	TERMINAL
402	43T60002	TERMINAL BLOCK; 3P
403	43T69004	SENSOR;HEAT EXCHANGER
404	43T69005	SENSOR;THERMOSTAT

Location No.	Part No.	Description
405	43T69079	PC BOARD ASSY;WRS-LED
406	43T60077	FUSE, TEMPERATURE, 73C
410	43T62003	CORD CLAMP
411	43T69568	PC BORD

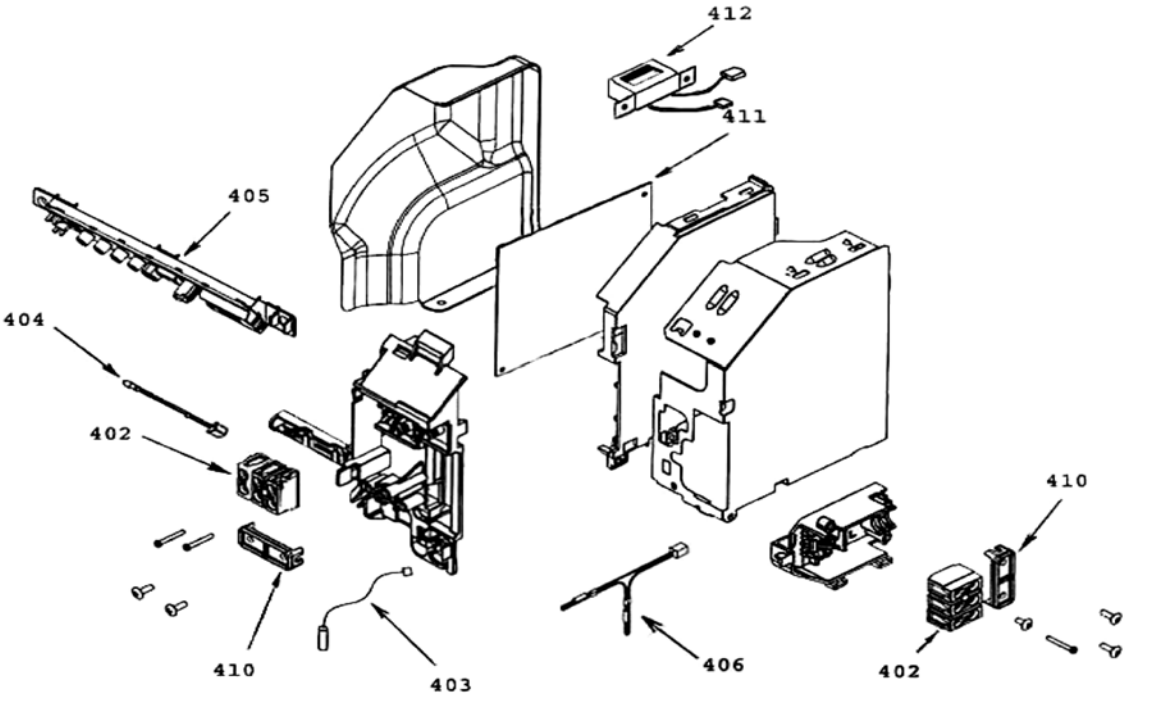
11-2. Indoor Unit (E-Parts Assy) (RAS-13NKHP-AS2)



Location No.	Part No.	Description
401	43T60001	TERMINAL
402	43T60002	TERMINAL BLOCK; 3P
403	43T69004	SENSOR;HEAT EXCHANGER
404	43T69005	SENSOR;THERMOSTAT

Location No.	Part No.	Description
405	43T69079	PC BOARD ASSY;WRS-LED
406	43T69364	FUSE,TEMPERATURE
407	43T60371	POWER CORD (AS)
410	43T62003	CORD CLAMP
411	43T69432	PC BOARD

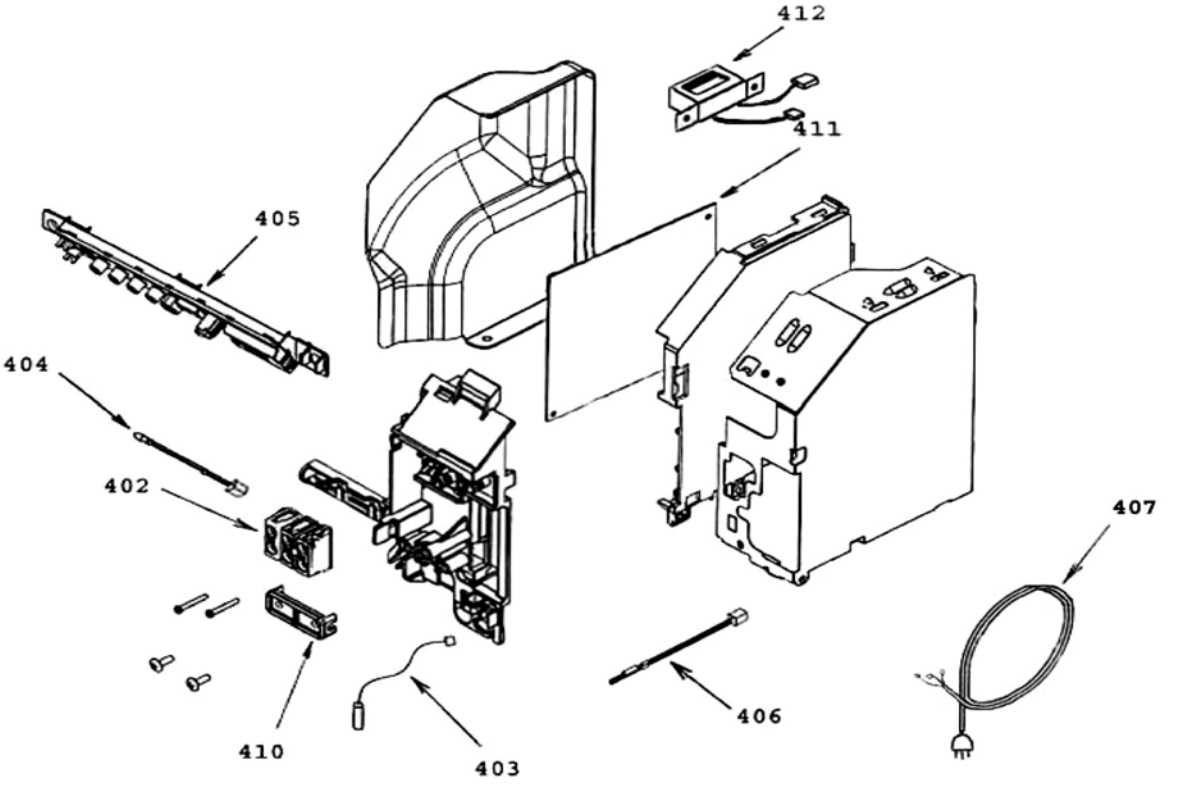
11-3. Indoor Unit (E-Parts Assy) (RAS-13GKP-ES2)



Location No.	Part No.	Description
402	43T60002	TERMINAL BLOCK; 3P
403	43T69004	SENSOR;HEAT EXCHANGER
404	43T69005	SENSOR;THERMOSTAT
405	43T69079	PC BOARD ASSY;WRS-LED

Location No.	Part No.	Description
406	43T60077	FUSE, TEMPERATURE, 73C
410	43T62003	CORD CLAMP
411	43T69567	PC BORD
412	43T69361	TRANSFORMER(TT-10)

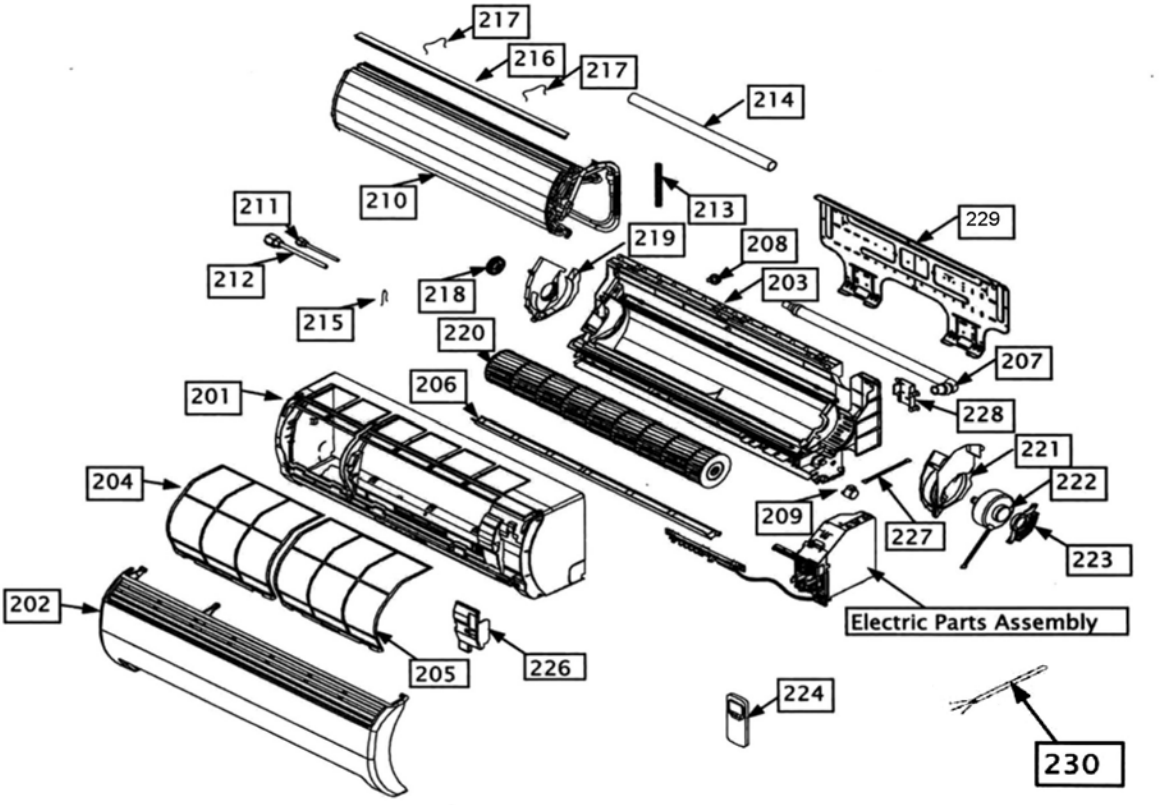
11-4. Indoor Unit (E-Parts Assy) (RAS-13NKP-AS2)



Location No.	Part No.	Description
402	43T60002	TERMINAL BLOCK; 3P
403	43T69004	SENSOR;HEAT EXCHANGER
404	43T69005	SENSOR;THERMOSTAT
405	43T69079	PC BOARD ASSY;WRS-LED
406	43T69364	FUSE,TEMPERATURE

Location No.	Part No.	Description
407	43T60374	POWER CORD (AS)
407	43T60374	POWER CORD (AS)
410	43T62003	CORD CLAMP
411	43T69367	PC BOARD
412	43T69361	TRANSFORMER(TT-10)

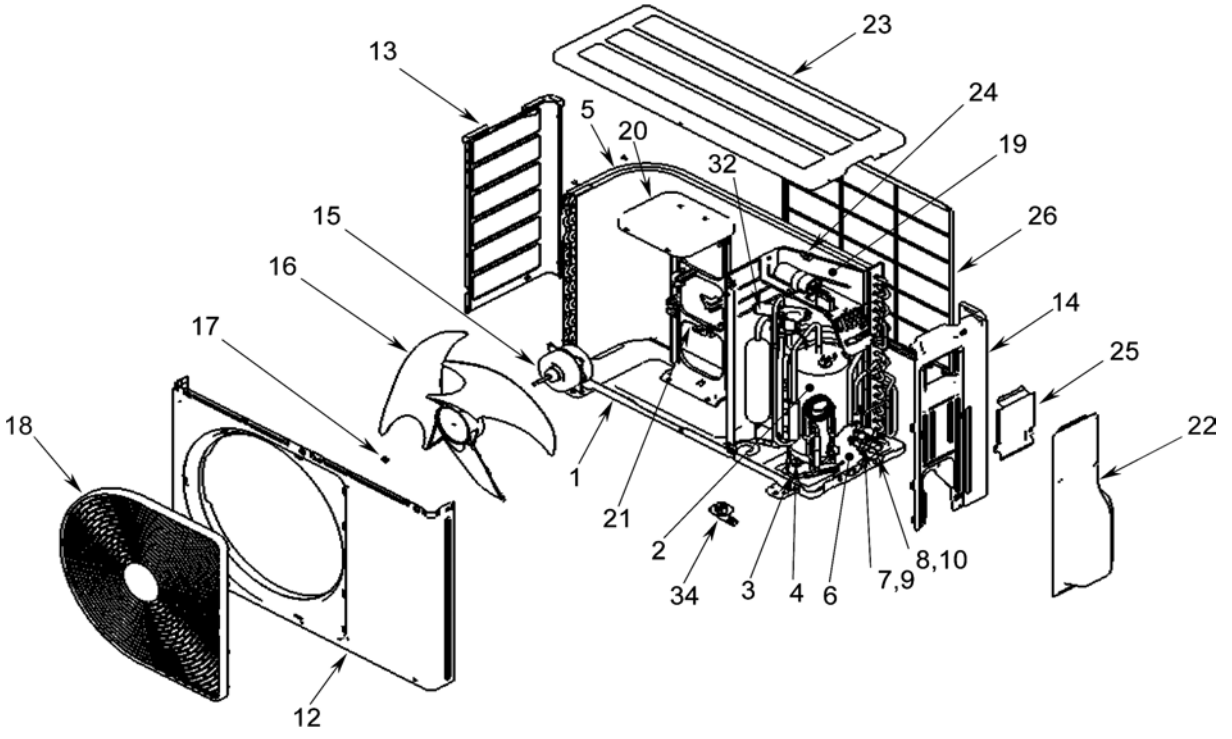
11-5. Indoor Unit



Location No.	Part No.	Description
201	43T00435	FRONT PANEL ASSY (RAS-13GKHP-ES2,RAS-13NKHP-AS2)
201	43T00430	FRONT PANEL ASSY (RAS-13GKP-ES2,RAS-13NKP-AS2)
202	43T09387	INLET GRILLE ASSY
203	43T03341	BACK BODY ASSY
204	43T80311	AIR-FILTER(R)
205	43T80310	AIR FILTER (L)
206	43T09328	HORIZONTAL LOUVER
207	43T70310	DRAIN-HOSE
208	43T79301	CAP-DRAIN
209	43T21372	MOTOR; STEPPING
210	43T44384	REFRIGERATION CYCLE ASSY (RAS-13GKHP-ES2,RAS-13NKHP-AS2)
210	43T44385	REFRIGERATION CYCLE ASSY (RAS-13GKP-ES2,RAS-13NKP-AS2)
211	43T47352	PIPE; DELIVERY
212	43T47353	PIPE; SUCTION
213	43T49330	SPRING
214	43T11302	PIPE-SHIELD
215	43T19302	HOLDER SENSOR

Location No.	Part No.	Description
216	43T49331	PLATE OF EVA SEAL
217	43T49006	HOLDER FOR PLATE
218	43T22308	ASM-M-BEARING
219	43T39301	BASE; BEARING
220	43T20321	ASSY-CROSS FLOW FAN
221	43T39302	BAND MOTOR-L
222	43T21322	MOTOR; FAN
223	43T39303	BAND MOTOR-R
224	43T69421	WIRELESS-REMOCO (RAS-13GKHP-ES2,RAS-13NKHP-AS2)
224	43T69422	WIRELESS-REMOCO (RAS-13GKP-ES2,RAS-13NKP-AS2)
225	43T83003	HOLDER; REMOTE CONTROLLER
226	43T62302	TERMINAL COVER
227	43T60317	CORD MOTOR LOUVER
228	43T07303	HOLDER PIPE
229	43T82310	PLATE; INSTALLATION(For 43T82301)
230	43T60359	CORD-FM

11-6. Outdoor Unit (RAS-13GAH-ES2, RAS-13N2AH-AS2)

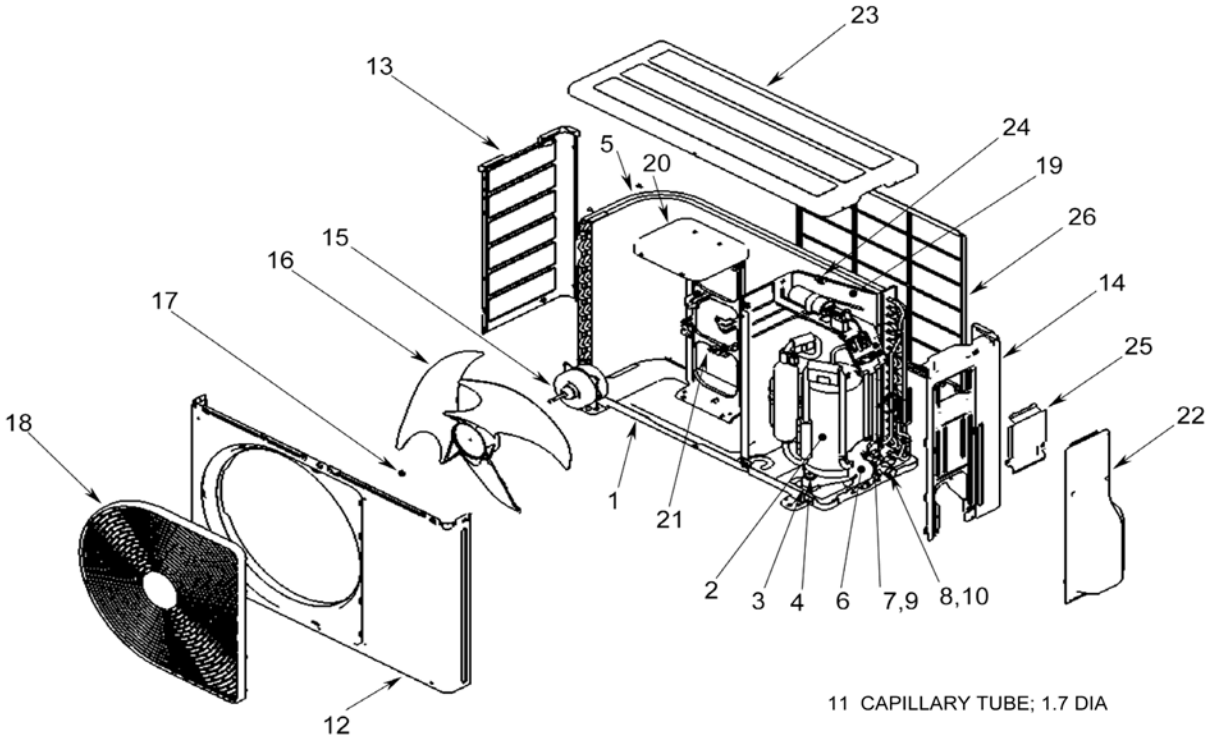


11 CAPILLARY TUBE ; 1.5 DIA
35 CAPILLARY TUBE ; 1.0 DIA

Location No.	Part No.	Description
1	43T42328	BASE PLATE ASSEMBLY
2	43T41380	COMPRESSOR(Made in China)
3	43T49008	CUSHION,RUBBER
4	43T97307	COMPRESSOR BOLT (M6)
5	43T43383	CONDENSER ASSEMBLY
6	43T00448	FIXING PLATE VALVE
7	43T46332	VALVE;PACKED 6.35 DIA
8	43T46335	VALVE;PACKED 12.7 DIA (H4)
9	43T47331	BONNET, 6.35 DIA
10	43T47333	BONNET, 12.70 DIA
11	43T47008	CAPILLARY TUBE; 1.5 DIA
12	43T00468	FRONT CABINET
13	43T00459	LEFT CABINET
14	43T00451	RIGHT CABINET ASSEMBLY
15	43T21362	FAN MOTOR(Made in China)
16	43T20319	PROPELLER FAN
17	43T47001	NUT FLANGE
18	43T19329	FAN GUARD

Location No.	Part No.	Description
19	43T04301	PARTITION
20	43T39322	MOTOR BASE CONNECTION PLATE
21	43T39318	MOTOR BASE
22	43T19330	PACKED VALVE COVER
23	43T00460	UPPER CABINER ASSEMBLY
24	43T96305	BUSHING
25	43T62325	ELECTRIC PART COVER
26	43T19331	FIN GUARD
28	43T61308	ELECTRIC PARTS BASE
29	43T55339	CAPACITOR,PLASTIC FILM
30	43T55325	CAPACITOR; PLASTIC-FILM
31	43T60373	TERMINAL-4P
32	43T46337	4 WAY VALVE
33	43T46339	COIL;V-4WAY;AC220-240V 50Hz
34	43T79305	DRAIN NIPPLE
35	43T47308	CAPILLARY TUBE; 1.0 DIA

11-7. Outdoor Unit (RAS-13GA-ES2, RAS-13N2A-AS2)



Location No.	Part No.	Description
1	43T42328	BASE PLATE ASSEMBLY
2	43T41380	COMPRESSOR(Made in China)
3	43T49008	CUSHION,RUBBER
4	43T97307	COMPRESSOR BOLT (M6)
5	43T43382	CONDENSER ASSEMBLY
6	43T00448	FIXING PLATE VALVE
7	43T46332	VALVE;PACKED 6.35 DIA
8	43T46335	VALVE;PACKED 12.7 DIA (H4)
9	43T47331	BONNET, 6.35 DIA
10	43T47333	BONNET, 12.70 DIA
11	43T47014	CAPILLARY TUBE; 1.7DIA
12	43T00468	FRONT CABINET
13	43T00459	LEFT CABINET
14	43T00451	RIGHT CABINET ASSEMBLY
15	43T21361	FAN-MOTOR

Location No.	Part No.	Description
16	43T20319	PROPELLER FAN
17	43T47001	NUT FLANGE
18	43T19329	FAN GUARD
19	43T04301	PARTITION
20	43T39322	MOTOR BASE
		CONNECTION PLATE
21	43T39318	MOTOR BASE
22	43T19330	PACKED VALVE COVER
23	43T00460	UPPER CABINER ASSEMBLY
24	43T96305	BUSHING
25	43T62325	ELECTRIC PART COVER
26	43T19331	FIN GUARD
28	43T61308	ELECTRIC PARTS BASE
29	43T55339	CAPACITOR,PLASTIC FILM
30	43T55325	CAPACITOR; PLASTIC-FILM
31	43T60367	TERMINAL-2P

TOSHIBA CARRIER (THAILAND) CO.,LTD.
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